

by Hillel Segal and Jesse Berst

How to manage your small computer

...without frustration

The Association of Computer Users'
Computer Fitness Series
Volume 2



Association of Computer Users'
**OFFICIAL
CONSUMER
GUIDE**
to business computer systems

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About ACU . . .

*The **Association of Computer Users, Inc.**, is a not-for-profit association with several thousand members in the United States, Canada, and many foreign countries. Further information about membership may be obtained by contacting ACU, P.O. Box 9003, 4800 Riverbend Rd., Boulder, CO 80301, (303) 443-3600.*

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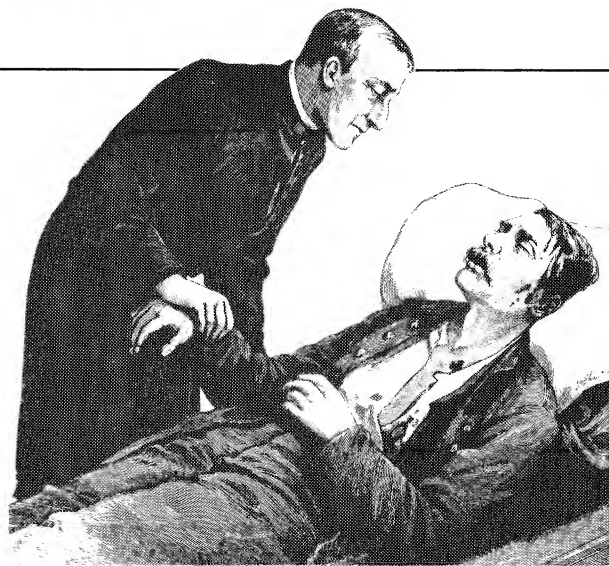
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INTRODUCTION

*“ . . . and then I
tried to computerize
without learning
from the mistakes
of other computer
buyers . . . ”*



It's always smart to learn from your mistakes. It's even smarter to learn from the mistakes of others.

The phrase above sums up the concept behind the official consumer guides produced by the Association of Computer Users. In our books, we share the experiences of other computer owners, along with the results of our independent testing programs.

Some of our other ACU books help you to shop for a small computer. This volume is a companion to those others. If you are about to install a computer, you will learn how to make the transition as smooth and painless as possible. If you already own a system, you will learn how to increase its lifespan and its value.

To our knowledge, there's nothing like this book anywhere else. It doesn't deal with theory or with technical details. Instead, it is written for and about non-technical business people who use a small computer. No one else has collected the hundreds of *practical* suggestions you'll find here.

Indeed, perhaps no one but ACU *could* produce this book. During its years as the

number one computer consumer group, the Association of Computer Users has fostered a continuing dialogue between computer users around the country. Our members have shared countless hints and suggestions with each other. This volume collects those no-nonsense ideas and presents them in an easy-to-understand form.

A single theme runs through every chapter: How to get a bigger return on your computer investment. It's one thing to find the right machine and get a good price on it. It's quite another to put that equipment to profitable use. Yet most computer users find themselves on their own when their new machine arrives. They have to learn all their lessons the hard way.

Several of the chapters have helpful worksheets. Many chapters also include collections of money and time-saving hints. The suggestions you will find in these special sections are not earth-shaking. Rather, they are methods for saving a few dollars here or a few minutes there. Search through the lists for ideas you can apply to your own situation. Taken together, these tips can easily save you hundreds of dollars.

Want your new computer to fit easily and smoothly into your business? Want to make your current small computer more valuable? Turn the page to start learning how to manage a small computer . . . *without* frustration.

Hillel Segal
Jesse Berst

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Section I:

| | |
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| 1 Preparing For Your Small Computer | 2 Installing Your Small Computer |
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How To Get Your Small Computer Up And Running

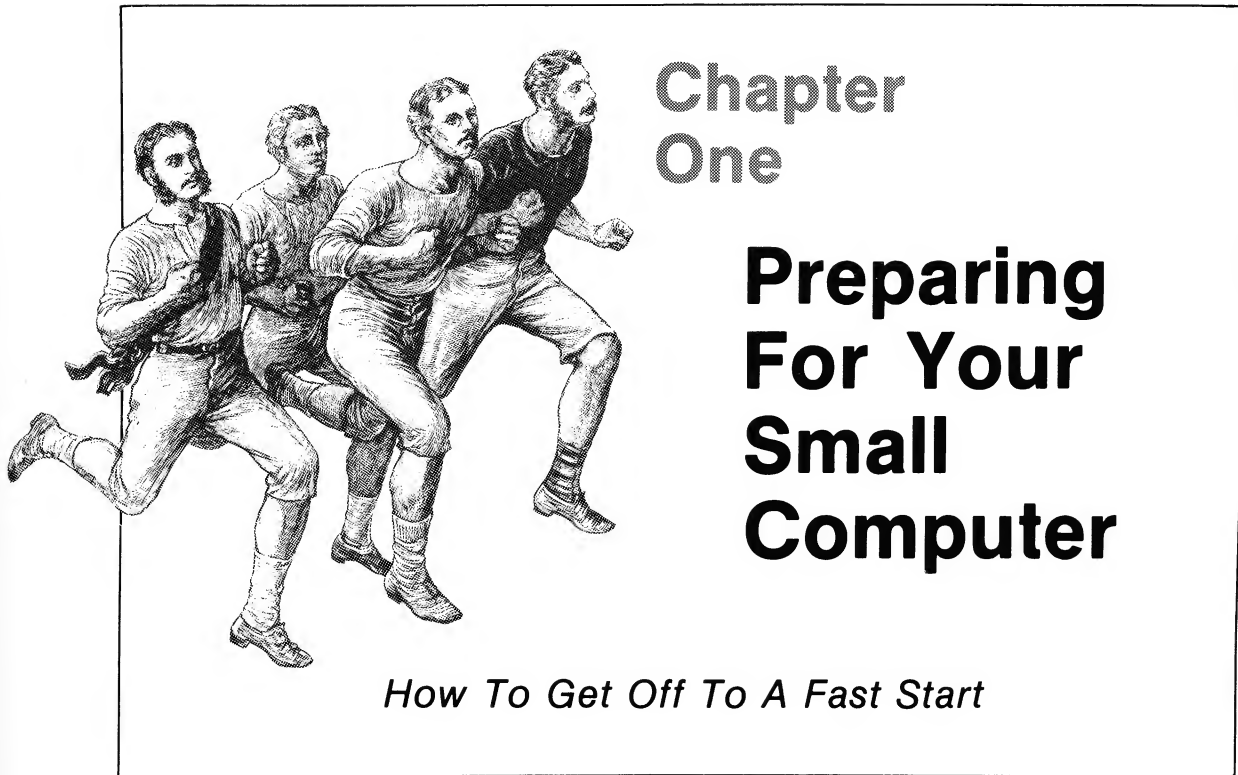
It will take more than wizardry if you need to wait months to get your new computer system to start producing . . .

Section I will be invaluable to you if you have purchased a computer but not yet installed it. Many computer buyers stumble on this first step. If you let installation trip you up, it can be months before you are able to regain your balance and get your new system up to full speed.

As a matter of fact, you may want to review this section even if your computer is already in your office. We've packed in enough solid advice from other users that even a long-time computer owner is bound to find money-saving ideas. For example, Chapter One, **Preparing For Your Small Computer**, explains how to prepare your site and your staff for a new computer, but many of the ideas will also pay off for someone who wants to improve an existing computer installation.

Chapter Two, **Installing Your Small Computer**, is also loaded with practical tips. Although we wrote it with first-time owners in mind, experienced users will also find valuable suggestions—suggestions you can use whenever you add a new application to your current system.

In a nutshell, this section is for you if you can't afford to wait months for a new computer system to start producing. If you want to hit the ground running, start by learning how others have done it.



Chapter One

Preparing For Your Small Computer

How To Get Off To A Fast Start

Football fans will recognize the old saying “The last ten yards are the toughest.” Most computer users don’t realize that this phrase is as true of computer systems as it is of football teams. Installing a computer is a complex, time-consuming operation. We know of systems that were on-site for months—in a few cases, years—before they were finally up to full speed and paying for themselves.

Throughout this book, we have assumed that you have already selected your hardware and software. Don’t follow the steps in this chapter until you have made your purchase decisions. If you are not yet to that stage, you may want to refer to other ACU publications that can help with the buying process.

After deciding which system to purchase, most buyers have no idea of the roadblocks they must still overcome. Part of the blame rests with vendors, who are fond of saying things like “Our machine will fit anywhere!” or “Anyone can learn to use our equipment in a matter of minutes!” Such promises are vast

understatements of the difficulties users face when setting up their machines. Indeed, you can buy the right computer and still fail at automation if you install and use it wrong.

Such failures arise because novice users don't know enough about automation to foresee the problems. Some of what we will discuss in this chapter may seem trivial at first. But these issues, while simple to solve early in the game, can cause you plenty of grief if left unaddressed. If this chapter does nothing more than warn you of the specific hurdles you must overcome, it will be a valuable lesson.

But this chapter will be more than just a warning—it will pass along techniques developed by other computer users—techniques to help you avoid the pitfalls of installation. These techniques can be boiled down to a single word: **preparation**. To minimize the hassles of installation you must (1) prepare your site and (2) prepare your staff.



The solution is quite simple: While you are waiting for your new computer to arrive, spend the time getting ready. Use our worksheets as the starting point.



Site Preparation

Many small computer buyers don't give a moment's thought to site preparation until the day the vendor carts the boxes through the door. That's probably why

the installation period sometimes goes down in history as “hell week”—or, worse yet, “**hell month.**”

If you are installing a computer in your existing office, space may be a problem. But resist the temptation to squeeze the new machine in wherever you can. Dumping a computer on someone’s desk creates disruption and resentment. Today’s smart machines are smaller than ever, but they still create noise, heat, clutter and other problems—problems that can drain away part of the savings the computer was supposed to provide.

For instance, we know of a wholesale distributor who ordered a small computer, then sat around until it arrived. Imagine his chagrin when he realized that he did not have any of the special preprinted forms he needed to create computer-generated invoices and mailing labels. Although he immediately ordered supplies, it took five weeks until they showed up. Meanwhile, the computer sat unused and unable to pay for itself.

Fortunately, the solution to such problems is quite simple: While you are waiting for your new computer to arrive, spend the time getting ready. You have three basic tasks to accomplish: (1) choose and prepare a spot for the computer; (2) order furniture and accessories; (3) order supplies. In all three cases, your most important job is to **plan ahead.**

To avoid overlooking important details, you should put your plans on paper. You can write directly on the worksheets at the end of the chapter—they are designed to be used this way—or you can use our suggestions as the starting point for checklists of your own. Either way, make sure your plan includes dates and milestones so you can chart your progress.

Choosing And Preparing A Spot For The Computer

At first glance, choosing a spot for the computer might seem like a trivial task. In actual practice, it can become an exercise in frustration because of the

problems a small computer can create. Here are some of the difficulties you must overcome, along with possible solutions:

Noise. Small business computers have noisy fans and disk drives. Even worse, many computer printers are much louder than the typewriter they replace. All this racket in a previously calm office can be quite distressing particularly if people share the same space or use phones nearby.

If you were planning to put the computer in the front office, you may want to rethink your decision. A low-noise, low-traffic back room might be a better alternative. If you have no choice but to put the computer in an office shared by other employees, consider an acoustic cover to reduce the racket. These boxes surround the printer, cutting the noise. They have a window so you can keep an eye on what's going on. Noise-absorbing partitions and ceiling tiles may also help soften the din of a printer.

Space. So-called "small" computers require a surprisingly large amount of space. In addition to the video terminal, you must find nearby spots for the disk drive(s), printer(s), and the items your operators will be using on a daily basis (floppy disks, preprinted forms, instruction manuals, paper, etc.). If you are not careful where and how you place the machine, the many cables and power cords can create inconvenience or even hazard.

Since you'll want to keep an extra stock of important supplies, you'll need back room storage for paper, printer ribbons and elements, floppy disks, magnetic tape, disk packs and so on. And since the idea of a small computer is to generate management reports to help you with your business, you will soon discover that your new machine is churning out paper at an alarming rate. Many of these reports must be kept for legal and tax purposes, so you will have to allocate space to store the printouts.

As if those space requirements weren't enough, some small computer users run into problems when a single machine is used for several purposes. Often, two or three different individuals must use the same terminal during the day. Yet if the

machine sits at the secretary's desk, she will be disturbed each time someone else uses it. What's more, people's "territorial" nature can cause psychological resistance when a computer must be shared. An office manager, for instance, may resent being forced to spend time each day sitting at a clerk's desk to use the terminal.

As a general rule, don't place a terminal at someone's workstation if he or she will be interrupted more than two or three times per day by other users. A "neutral," shared space is a much better idea for multiple-use computers, as long as no single user takes up more than about 20 percent of the machine's time. If one person is at the terminal more than 20 percent of the time, you will encounter conflicts unless you get an additional terminal or create a strict schedule to delineate who uses the computer when.

Heat. Many buyers are fooled into thinking that microcomputers do not require air conditioning. Although the equipment itself may not need cooling, the people who operate it will. Small computers and their peripherals put out a lot of heat. On a summer day, a computer can make a small room intolerably hot.

Most installations will require at least a fan during warm months, and many users will discover that refrigerated air conditioning is almost mandatory if the system is used more than a few hours per day. Plan for it.

Special power requirements. Your first problem is to ensure that you have enough power outlets in your chosen spot, since some systems require as many as eight separate plugs. It's wise to plug the printer and the computer into separate outlets served by separate circuits. All outlets should be able to accommodate a three-prong plug, with the third prong connected to a true ground line—never use a two-prong adapter.

If you have enough power, you must still make sure that it is "clean," since small computers will not function properly if subjected to "dirty" electrical power.

Electrical “noise” and voltage fluctuations can have disastrous consequences. Nearby devices that draw a lot of power can cause voltage drops; copying machines and electric heaters are notorious offenders. Many computer “failures” have been traced to voltage fluctuations from other office machines that shared the same power line.

The best solution—but one that will be too expensive for most small computer users—is to install a dedicated power line for the exclusive use of the computer. This requires considerable planning and, unfortunately, is not always feasible in older buildings without exorbitant expense.

A more realistic solution is to put inexpensive line filters or regulators between your computer and the outlet. Even though some claim their gear is filtered internally, no installation should be without some type of electrical protection.

Static electricity. Static electricity can wreak havoc with small computers, destroying data on floppy diskettes or even damaging the circuitry. The dryer the environment, the greater the problem.

In general, small computers should not be installed on carpeted floors. If you cannot meet this requirement, you may want to install a humidifier on your heating and air conditioning equipment. You can eliminate virtually all static electricity problems by keeping the relative humidity over 50 percent.

Where humidifiers are too expensive, but static charges are still a problem, purchase anti-static mats or carpets. By draining off static electricity, they prevent damaging “shocks.”

Don’t try to use any of the anti-static sprays on the market as a long-term solution to static build-up. Although some of them are temporarily effective, they do not last long enough to provide real protection. You may not discover that you need another spray treatment until a static discharge has destroyed important data.



CONSUMER ALERT

Your Computer's Number One Enemy: Static Electricity

Once everything is up and running, the most common problem that plagues new computer installations is static electricity. Generated by carpets or clothing, these small shocks can jolt the sensitive chips in your computer or render entire diskettes unreadable.

Static electricity can introduce incorrect data into a file; can cause a program to "crash;" or can even erase everything you've worked on since you started up that day. It's not uncommon for entire files to be lost or destroyed, causing countless hours to replace or reconstruct them.

The problem is so serious, and so pervasive, that we wanted to bring it to your attention in this separate box. Fortunately, some simple precautions can control the problem. Most users should install an anti-static mat for the computer area. The mats ground the people who step on them, eliminating shocks and the danger to equipment and data.

You can take other steps to reduce static electricity if it proves to be a continual headache. One remedy is to find a better site for the equipment. There are other partial solutions:

- Ban crepe-soled shoes and synthetic sweaters from the computer room.
- Consider installing an air-ionizer to stabilize the balance of electrical charges in the room.
- Keep all unnecessary plastic items out of the room.
- Equip all carts, dollies and other movable equipment with conductive wheels. Never drag these pieces of equipment.
- Prohibit the use of waxes and aerosol sprays, which help conduct electrical charges.

Security. If your office currently contains nothing more valuable than an electric typewriter, you may be unprepared for the responsibilities of having \$10,000 to \$50,000 worth of equipment in a single room.

Computer security is such an important topic—and such an *overlooked* topic—that we have devoted Chapter Four to it. For the moment, suffice it to say that it would take a thief only a few moments to unplug and cart off a small computer system. If your chosen site does not have adequate locks and burglar alarms, you should add them before the equipment arrives.

Lighting. Although your lighting may be adequate right now, it may prove unsatisfactory when you bring in a video terminal. Glare from strong overhead lights or from windows can make it virtually impossible to see the screen. Indirect lighting is best, but few users can afford to remodel their lighting system. If overhead lights are a problem, try turning them off and supplying operators with adjustable lamps at their desks. Window glare can be solved with blinds or shades.

The worksheet at the end of the chapter summarizes the site preparation you should schedule before the delivery of your computer.

Ordering Furniture And Accessories

Although many small computers are called “desktop units,” you will be disappointed if you try to get by with one of your existing desks. An ordinary table or desk will put the keyboard too high for easy typing, while most typing extensions and typing tables are too small for an entire computer. You may get the terminal to fit, but you must also find a place for such things as the central processing unit, an expansion box, outboard disk drives, tape drives, modems and so on.

The best solution is usually to invest in specially designed computer furniture. Although it's not cheap, good computer furniture has special shelves for all the peripherals, as well as outlets and slots to keep wires and cables safely out of the way.

Equally important is a good printer stand. Don't try to place the printer on the same table as the computer itself. The vibration will make it difficult to work while the printer is on, and, over time, may even damage fragile electronic circuitry. Specially designed printer stands also have a place to store the box of paper you feed into the unit, as well as a "landing site" for the finished printout.

You'll also need shelves to store computer paper, floppy disks and other supplies. If your accounting reports are printed in extra-wide 132 column format, make sure that your shelves and filing cabinets can accommodate paper of this size.

And consider an investment in low-cost accessories to make your employees' jobs easier. Operating a computer requires a high degree of neatness and precision. You can help your staff by providing such aids as diskette organizers, tape racks, output binders, copy stands (for holding material in an easy-to-read position for entry into the computer), and anti-glare screens or hoods for the terminal.

Finally, don't forget that your new software will come on fragile magnetic media. What's more, you will be storing important, sometimes confidential, information on floppy disks or on tape. If you do not have an off-site safe-deposit box large enough to accommodate your needs, you should invest in a fireproof safe for critical data files and master copies of programs.

The worksheet at the end of the chapter summarizes the furniture and accessories you should consider ordering before the delivery of your computer. Your vendor may be able to sell you the needed items or recommend a supplier.

Ordering Supplies

Installation will go faster and smoother if you prepare by securing in advance all the supplies you will need. If you wait to buy until these items are actually needed, you may find your computer operation shut down for a day or two while you scour the city for the things you need.

Preprinted forms, for instance, can cause real headaches if not ordered ahead since they take as long as eight weeks from design to delivery. Backup tapes or diskettes are also crucial, so keep lots of them on hand. They are very cheap compared to the cost of reentering data that wasn't backed up because the operator couldn't find any extra diskettes.

In general, try to keep a three-month supply on hand. Your vendor can help you estimate how much you will need the first time around and may be able to sell you what you need (although the prices may be higher than mail order sources). The worksheet at the end of the chapter summarizes the supplies you should consider ordering before the delivery of your computer.



IDEAS YOU CAN USE



Site Preparation

Here are some nuts-and-bolts methods other computer owners have used to make site preparation easier. Check the list to see if there are any you can use.

- If your operators will be entering source data from paper each day, you should invest in copy stands to make their jobs easier. The cost of the devices will quickly be made up in increased productivity. Some copy stands rest on the desk near the keyboard, but most operators prefer the type that are on an adjustable arm which can be positioned as the typist likes.

Another excellent solution is a terminal stand like the patented model from Input-EZ, Inc. Since the source document sits between the keyboard and the display, the operator does not have to make head movements from side to side. This reduces neck and back strain and speeds data entry.

- To determine the best location for your new computer, it is helpful to prepare a rough sketch of your office. Identify walls and partitions and include the location of electrical outlets and air circulation ducts in the area where installation is contemplated.

Cut out pieces of paper to scale in the shape of the computer desk. Try out different office layouts, checking each alternative for these factors:

- proximity to electrical power
- ease of circulation for employees
- ease of access for employees who will use the computer (e.g. must they disturb others or climb over wires to get to the terminal?)
- space for supplies
- proximity to other employees who would be disturbed by the noise

You may get some unpleasant surprises as you attempt to juggle conflicting needs. Far better to do this on paper, however, than to continually uproot and disturb your staff. Don't wait until the computer actually arrives to experiment with different placements.

- Air conditioning can cost a bundle. If incoming light from nearby windows is contributing to heat buildup, consider treating the glass with reflective film. Besides lowering temperatures, the film also blocks offensive glare that can drown out the images on your CRT screen.
- Many users save 30-50 percent on supplies by ordering from mail order sources rather than from the equipment manufacturer. Here are names of a few well-known suppliers. **Warning:** ACU cannot vouch for any firms listed here. Mail-order rip-offs are not unknown in the computer field. Check out the company you are dealing with before ordering.

All-State Legal Supply Co.
269 Sheffield St.
Mountainside, NJ 07092

American Business Systems
700 East Main St.
Richmond, VA 23219

American Electrodata Inc.
566 8th Ave. NW
New Brighton, MN 55112

American Word Processing Co.
18730 Oxnard St.
Tarzana, CA 91356

Bancroft Business Forms Inc.
24 West 25th St.
New York, NY 10010

Batson Co. Louis P.
Box 3978
Greenville, SC 29608

Benedetti Corp.
Harbor Universal Inc.
3011 E. Pico Blvd.
Los Angeles, CA 90023

Beta Business Systems
5555 Magnatron Blvd., Suite J
San Diego, CA 92111

Checks To Go
P.O. Box 425
La Mesa, CA 92041

Computer Media Products

5482 Complex St., Suite 110
San Diego, CA 92123

Computer Shopper

P.O. Box F153
Titusville, FL 32780

Computer Trader

1704 Sam Dr.
Birmingham, AL 35235

Daily Business Products Inc.

130 W. 29th St.
New York, NY 10001

Daisy Wheel Ribbon Co., Inc.

9375 Archibald Ave., Suite 401
Cucamonga, CA 91730

Data Enterprises, Inc.

2635 Pettit Ave.
Bellmore, NY 11710

Datapro Research

1805 Underwood Blvd.
Delran, NJ 08075

Devoke Co.

3780 Fabian Way
Palo Alto, CA 94303

Diversified Business Comm. Ltd.

7475 Kimbel St., Unit #8
Mississauga, Ontario
Canada L5S 1E7

DSG Inc.

1737 Chestnut St.
Philadelphia, PA 19103

Dymarc Industries Inc.

7133 Rutherford Road
Baltimore, MD 21207

Electronic Specialists, Inc.

171 South Main Street
Natick, MA 01760

Formats Unlimited Inc.

36 Cherry Lane
Floral Park, NY 11001

Gates Acoustinet Inc.

P.O. Box PP
Santa Rosa, CA 95403

Hemisphere Steel Products Corp.

54 N. 11th St.
Brooklyn, NY 11211

Inmac, Inc.

2465 Augustine Dr.
Santa Clara, CA 95051

Jensen Engineering Inc.

1589 Hampton Way
P.O. Box 7446
Santa Rosa, CA 95491

Lanier Business Products

1700 Chantilly Dr. NE
Atlanta, GA 30324

Magnetic Technologies Inc.

50 Merrick Rd.
Rockville Centre, NY 11570

Media Control Co. Inc.

453 Burnside Ave E
Hartford, CT 06108

Micro Exchange, The

224 8th St.
Manhattan Beach, CA 90266

Microsette Co.

475 Ellis St.
Mountain View, CA 94043

New England Business Service, Inc.

North Main St.
Groton, MA 01450

Spectrum Enterprises

10 High St.
Morristown, NJ 07960

Standard Manifold Co.

333 W. Lake St.
Chicago, IL 60606

Triglid Limited

80 Galaxy Blvd., Unit 3
Rexdale, Ontario
Canada M9W 4Y8

United Technical Products, Inc.
32 Southwest Industrial Park
Westwood, MA 02090

Used Computer Exchange
11484 Washington Plaza West #4061
Reston, VA 22090

Van Ess Computer Forms
401 Investment Blvd.
Pittsburgh, PA 15222

Van San Corp.
16735 E. Johnson Dr.
City of Industry, CA 91745

Viking Acoustical
Airlake Industrial Park
Lakeville, MN 55044

Visible Computer Supply Corp.
3626 Stern Dr.
St. Charles, IL 60174

WP/AS Concepts Co.
A Div. of Hamilton Sorter Co.
P.O. Box 8
3158 Production Dr.
Fairfield, OH 45014

**Wordflow Systems Div.
of Dak Supply Corp.**
21555 Drake Rd.
P.O. Box 36150
Cleveland, OH 44136

Word Processing Group
P.O. Box 306
1908 Clearview Parkway, Ste. 204
Metairie, LA 70004

People Preparation

People preparation is often the missing link to successfully automating a business. Although few first-time buyers realize it—and few vendors mention it—training and other forms of preparation are as essential as the equipment itself.

When not handled with care, the changeover from manual to automated methods can have negative results. People problems such as the loss of valued employees or even the sabotaging of equipment have plagued many small computer users. These problems can usually be avoided by advance preparation and common sense preventive measures.



Although people problems present serious roadblocks, the solutions are largely common-sense—and often inexpensive to boot.



Typical Problems

Perhaps the most important single step to solving people problems is to take them seriously. No matter what the size of your computer, success or failure depends to a large degree on the people using it.

We know, for example, of a general contractor who purchased a small computer for accounting and word processing. Six months later, he was the only one using it. His clerical staff went out of its way to work around the system. They were fearful of their jobs, afraid of damaging expensive equipment and frustrated by the time it took to learn things on their own. Not until he instituted formal training sessions could the contractor get his staff to use the equipment.

If you have spent thousands of dollars on your new computer, you have a large stake in its success. Your staff, on the other hand, does not have that same emotional commitment. Indeed, they may be afraid of computers. To successfully automate your business, you must begin with that assumption and base your

preparations on it. Here are some typical comments from neophyte computer users:

"I heard the radiation from the screens can make you sterile."

"As soon as they get the computer to work, they're going to fire us!"

"I don't want to be a robot!"

"I'm afraid to touch it, because if I make a mistake I might break it."



Research has shown that computers do not present any health hazards, yet first-time users often believe the rumors. Even when employees don't fear the new computer, they often resent it. In some cases, they see it as a threat to their small "empire" or an invasion of their "turf" that will lead to loss of status. Or they may resent the increased discipline demanded by computerization. Automation often changes the way people must work.

For example, your staff may now have to complete, collect and deliver sales reports to the computer by a certain time. Or they may no longer be able to procrastinate on making pricing changes because the computer will catch them. Many old, comfortable habits may be disrupted. The new, more disciplined procedures may be resented and opposed.

Some Solutions

Although people problems present serious roadblocks, the solutions are largely common sense—and often inexpensive to boot.

First, make the announcement of intended computerization early, and make it in person. Don't let your staff learn of it through the office grapevine, where rumors can get out of hand. If employees are left to speculate, they may assume the worst—that you are planning to replace them with machines. Give your people plenty of time to get used to the idea, rather than confronting them with a *fait accompli*. Many people problems originate from fear of the unknown, which is heightened when computers appear without notice.

Second, involve all the people who will be using the computer. Although management will want it for decision-making purposes, the operators will be using the computer every day. Ideally, the new system should satisfy both groups.

If different individuals will use the system, get all of them involved. Without such participation, the results may be inadequate use of the computer and employee dissatisfaction. Depending on their attitude and motivation, your operating personnel can make a poor system work . . . or a good system fail.

It may be too late for you to involve all of your staff in the selection of the computer itself, but you can still ask them to participate each time you add a new application. Ask for their recommendations. Listen to them. Give them credit for their contributions. And keep them informed of progress.

Here's another common sense tip for avoiding people problems: Choose your operators with care. Matching the person to the job is as important here as it is in any position. Experience has shown that knowledge of the job being done (accounting, or word processing or whatever) is more important than knowledge or interest in computers. When it comes to doing accounting on a computer, for instance, it's much easier to teach an employee familiar with bookkeeping than a programmer familiar with computers.

Don't forget to name at least one "backup" operator for each important job. Be sure more than one person knows each part of the system, so that you won't be devastated if a key individual quits or gets sick. Backup of your staff is as important as backup of your data.

Training Pays Off

A good training program is one of the most important facets of preparing your people. Small computer buyers often assume that the vendor will take care of training or that their operators will learn everything they need by reading the manuals.

Successful training involves more than handing your operators some booklets to read at home. Although most of the hands-on learning will take place after the equipment arrives, we suggest that you begin training as early as possible.

Here are the four main points your program should cover:

1. General Introduction. This first session should be conducted by someone from management, with assistance from the vendor if you decide to include a demonstration of the system. Invite as many people as practical, including employees who will not actually operate the machinery. Describe the basic purposes of the system, making sure to demystify it and debunk the myths. For instance, reassure your staff that the computer will not replace anyone.

Although you will be delivering some hard facts during this first training meeting, your major role is to sell the system. It may not be easy. Certain individuals may be deliberately disruptive. Others may try to tell you why the system can't possibly work.

Try to make your staff feel that they are running the computer, not being run by it. Explain to each person what the computer will do for them, how it will save them time, how they can come to it for answers, how it will eliminate the most tedious jobs. The first part of any training program must convince your staff

of the benefits of automation.

2. Manual Procedures. The second session can also be given before the computer arrives. Once again, you should invite more than just the computer operators themselves. Providing data for the computer will probably require some new manual processing procedures.

3. Operating Basics. The third session will have to wait until the computer actually arrives. Invite everyone who may actually operate the equipment, including operators, backup operators and managers. This session is not to demonstrate specific programs, but to teach your staff how to treat the computer:

- how to turn it on and restart it
- how to recover from errors and power failures
- how to maintain it (cleaning disk drives, inserting new printer ribbons and paper, etc.)
- how to safely handle and store magnetic media
- how to handle machine utilities common to all programs (preparing blank diskettes, backing up data, etc.)
- security and disaster procedures

We will cover many of these important topics in detail in subsequent chapters.

4. Software Specifics. Last, but not least, you must train your staff in the use of each individual program. These training sessions should be attended by the operator, the backup operators, and the supervisor of these individuals, as well as management. Generally, the vendor will provide training sessions, either at the vendor's office or at your place of business. Even if it costs extra for this training, it will be money well spent.

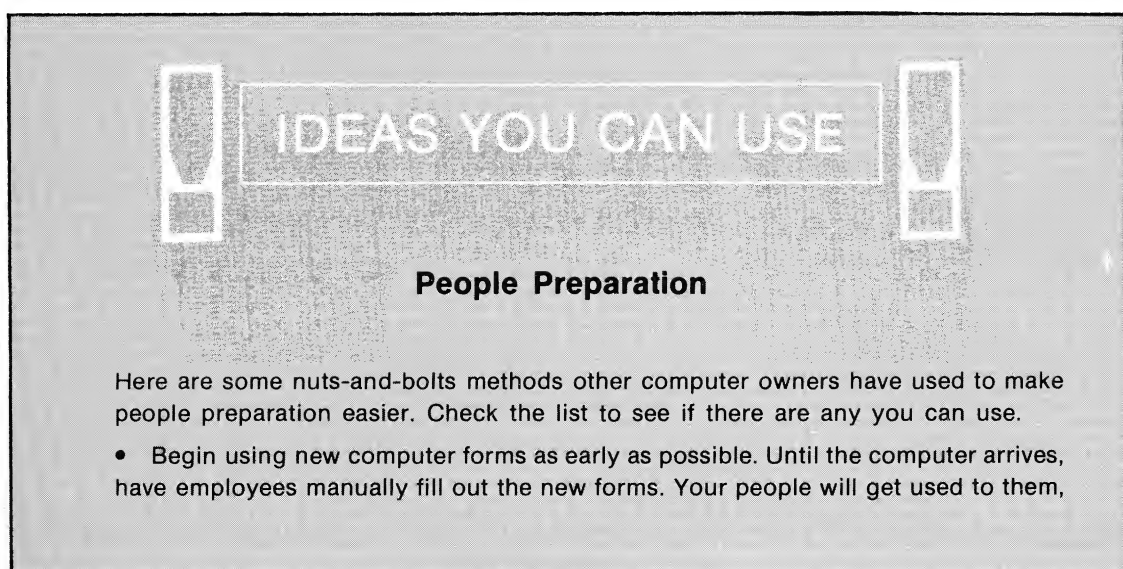
If the software comes only with some type of "self-teaching" guide, management will have to become familiar enough with the program to teach the clerical staff what to do. Start by using test data, so that mistakes won't matter. Try to

establish a “safe” atmosphere for your operators so they will be encouraged to ask questions.

Where do you find the materials for training programs? Many vendors will help you at little or no additional cost. Some software packages come with tutorial manuals. You can find independently produced books for a few of the most popular programs, such as the word processing package called WordStar. Books, magazines and computer seminars are sources of general information that can be passed along to your staff.

If your budget permits, you can hire an outside training consultant to create a program for your employees. And some computers have computer-aided instruction (CAI) programs that instruct new users right on the screen. Some independent companies also produce CAI programs that teach about popular operating systems, word processing systems or computer languages. We recommend CAI because it gets new users comfortable with the machine as they learn.

Although training involves an initial investment of management’s time and effort, the up-front cost can pay off in years of trouble-free operation and a staff that welcomes automation.



IDEAS YOU CAN USE

People Preparation

Here are some nuts-and-bolts methods other computer owners have used to make people preparation easier. Check the list to see if there are any you can use.

- Begin using new computer forms as early as possible. Until the computer arrives, have employees manually fill out the new forms. Your people will get used to them,

easing the anxiety of changing over, and you may discover problems in time to correct them before you transfer to the computer.

- Some hardware and software vendors sell programmed instruction manuals on a variety of data processing topics. These self-study guides methodically lead the reader through a particular subject. They can be a low-cost way to give your staff a basic grounding in computer fundamentals. A few companies even provide audio-visual courses on videotape.
- Check your contract for any mention of training and ask the vendor what has been provided to other users. You may be entitled to free on-site classes or discounts on vendor-sponsored seminars.
- Computer vendors typically give a few "free" hours of training and a single training manual. Additional manuals typically cost \$35 or more, and instructor time is billed at about \$100 per hour. Many users don't realize, however, that these fees are negotiable. Most companies will toss in additional training time in order to secure an order, or lower their fees to stay in the graces of a good customer. Now that many systems offer similar capabilities, you can afford to choose on the basis of support, including continuing support for new hires.
- Training classes should be as realistic as possible. Even if presented by the vendor or an outside training consultant, try to use actual company documents and data for the sample problems.
- Users groups and computer clubs often sponsor classes on computer topics led by one of their expert members. Generally the classes are free to members. **Warning:** Check first to see if the class is intended for beginners or for advanced users with technical know-how.
- Your industry trade association may sponsor computer seminars, user groups or classes on specialized topics. Many retail and wholesale distribution associations, for instance, regularly sponsor meetings on automated inventory control, point-of-sale, etc.
- Many vendors can provide you with complimentary tickets to nearby computer expositions and seminars where you and your staff can attend a variety of educational lectures and see booths displaying the latest in computer hardware, software and accessories.
- Training companies and consultants offer a wide variety of products and services, some of which are within the budget of a small computer user. Ranging from one-person shops to large multimedia firms, they can sell you mail-order materials, or conduct classes at your site or at their own facilities.

Here is a partial list of the data processing training materials and classes available:

Advanced Systems, Inc.

1601 Tonne Road
Elk Grove Village, IL 60007

American Management Association

135 W. 50th Street
New York, NY 10020

American Training Incorporated

3800 Highland Ave., Suite 300
Manhattan Beach, CA 90266

Auerbach

6560 North Park Drive
Pennsauken, NJ 08109

CRWTH Computer Coursewares

12655 Washington Blvd.
Los Angeles, CA 90066

Deltak, Inc.

1220 Kensington Road
Oak Brook, IL 60521

Edutronics

(McGraw-Hill, Inc.)
55 Corporate Woods
Overland Park, KS 66210

Evolution 1

(Electronic Data Systems Corp.)
14580 Midway Road
Dallas, TX 75234

Integrated Computer Systems

3304 Pico Blvd.
Santa Monica, CA 90405

New York Management Center

360 Lexington Avenue
New York, NY 10017

SECT

The Source of Ed. Computer Training
620 N. Brand Blvd., #301
Glendale, CA 91203

- Small computer users should take advantage of universities and junior colleges. Consider enrolling key members of your staff in a computer course.
- Employees with computer responsibilities should belong to appropriate professional organizations, attend seminars and subscribe to trade publications. Here are the names of a few representative groups. There are dozens of others around the country.

Alpha Micro Users Society

8380 SW 151 St.
Miami, FL 33158

Apple Medical Users Group International

2914 E. Katella, Suite 208
Orange, CA 92667

Association of Computer Programmers

294 Main St.
East Greenwich, RI 02818

Association for Systems Management

24587 Bagley Rd.
Cleveland, OH 44138

The Apple Guild

P.O. Box 371
Weymouth, MA 02188

Microcomputers In Planning Association

1204 People's Bldg.
60 Monroe at Ionia
Grand Rapids, MI 49503

NMB Computer Society for The TRS-80

17400 NE 7th Ct.
North Miami Beach, FL 33162

Oasis Users' Group

P.O. Box 2400
Santa Barbara, CA 93120

Association of Computer Users (ACU)

4800 Riverbend Road
P.O. Box 9003
Boulder, CO 80301

Chicago TRS-80 Users Group

203 N. Wabash, #2118
Chicago, IL 60601

The Data Entry Management Association

P.O. Box 3231
Stamford, CT 06905

Data Processing Management Association (DPMA)

505 Busse Hwy.
Park Ridge, IL 60068

Digital Equipment Computer Users Society

Decus U.S. Chapter Office
One Iron Way
MR203/E55
Marlboro, MA 01752

First Osborne Group

P.O. Box 11683-A
Palo Alto, CA 94306

Hospital Information Systems Sharing Group

2415 South 2300 West
Salt Lake City, UT 84119

International Apple Corps.

P.O. Box 2227
Seattle, WA 98111

Personna

P.O. Box 759
Point Pleasant, NJ 08742

PET User Group of the Silicon Valley

22355 Rancho Ventura
Cupertino, CA 95014

San Francisco Apple Core

1515 Sloat Blvd., #2
San Francisco, CA 94132

The Society of Certified Data Processor (SCDP)

1835 Union Avenue, Ste. 325
Memphis, TN 38104

Society for Computer Applications in Engineering, Planning and Architecture

358 Hungerford Dr.
Rockville, MD 20850

Society for Computer Medicine (SCM)

9650 Rockville Pike
Bethesda, MD 20014

Unix Operating Systems/ User Group

P.O. Box 2400
Stanford, CA 94305

West Oakland Computers Users

1691 Eason
Pontiac, MI 48054

- One non-threatening way to get people familiar with the computer is to have them start by playing games. Invite your staff to challenge you to a game of Star Trek or to tackle the computer at chess. It will teach them not to fear the machine.
- You may be able to get a large amount of free site-planning assistance from your vendor, just for the asking. Vendors can often supply technical suggestions or even layouts and photos of "model" installations, as well as the names of local companies who sell supplies and furniture.
- If you must run power cords or computer cables where people walk, remember that you can replace conventional round wires with flat cable designed to lie under

carpets. Most office supply houses also stock plastic raceways that lay on top of the carpet to prevent tripping and allow carts to be rolled over round wires.

- Make sure that heating and cooling vents blow air from the computer towards the general work areas. If the flow is reversed, cigarette smoke and other contaminants will accumulate on the equipment. Use a small fan if necessary.
- Obtain covers for all of your equipment. Ideally, they should be nonconductive, waterproof and flame-retardant. Ask your operators to cover the machines at night and whenever they will be unused for more than a few hours. (Never cover a machine that is on; the heat buildup can cause serious damage.)
- To prevent glare on CRT screens, some small computer owners have had to block off windows or reposition ceiling lights. Before you take such relatively expensive steps, consider investing in an inexpensive glare filter for the screen itself. A few computers come with specially-coated screens as standard equipment. Most users, however, will have to resort to add-on filters.

Excellent, low-cost products are available from several different manufacturers. Polarized filters and nylon mesh filters are two options that work well. **Warning:** Don't buy an inexpensive "green filter" expecting it to cut glare. These devices simply color the CRT's light output, and often make glare worse, not better. Make sure any filter you get is designed specifically to reduce unwanted reflections.

- When several people share a single terminal, conflicts quickly arise over space, seating and privacy requirements. Consider placing the terminal on a lazy-susan or swivel table to allow convenient access. There are several such units on the market. A rotating terminal permits a many-sided cluster arrangement, so each operator can have a small individual space to tailor to specific needs.

The Importance Of A Plan

Regardless of the specific measures you take to prepare your people, you'll experience fewer headaches if you have a written plan and a timetable for installation. Post it where employees can follow along so they know when they are expected to complete their training.

Only a step-by-step outline can avoid the chaos that so often accompanies the

arrival of a new computer. The return you get on your computer depends in part on how well you install it. The worksheets at the end of this chapter will help you make sure you haven't overlooked the most important tasks.

In the following chapter: Hints on preparing your company's data to be transferred to the computer, as well as a detailed plan for what to do after it arrives.

WORKSHEET #1 (a)**SITE PREPARATION**

Below is a list of typical site preparation tasks. Check off the ones that apply to your installation, assign responsibility for completion to appropriate employees, then monitor progress to ensure that they get done before the arrival of the equipment.

| Check if needed: | Assigned to: | Date begun: | Date completed: |
|---|-----------------|----------------|--------------------|
| Selected site for equipment | | | |
| Find room nearby for supplies | | | |
| Find backroom storage for bulk supplies | | | |
| Install noise-reducing partitions | | | |
| Install noise-reducing ceiling tile | | | |
| Remove or replace carpeting to reduce static buildup | | | |
| Install air conditioning | | | |

(Continued)

WORKSHEET #1 (b)

SITE PREPARATION

| Check if needed: | Assigned to: | Date begun: | Date completed: |
|--------------------------------|-----------------|----------------|--------------------|
| Install humidifier | | | |
| Install dedicated power line | | | |
| Install locks, bars and alarms | | | |
| Install new lights | | | |
| Install window blinds | | | |
| Install smoke detectors | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

WORKSHEET #2 (a)**FURNITURE AND ACCESSORIES**

Below is a list of furniture and accessories typically needed for a new small computer system. Check off the ones that apply to your installation and order them in time to arrive before the computer itself. Included is a space to record the name of the supplier and the price information that will come in handy when you reorder.

| | Check if needed: | Date ordered: | Suppliers name: | Quantity and price: | Date arrived: |
|--------------------------------|---------------------|------------------|--------------------|------------------------|------------------|
| Noise hood for printer | | | | | |
| Line filters | | | | | |
| Outlet strips | | | | | |
| Anti-static mats or carpets | | | | | |
| Shelves for supplies | | | | | |
| Computer desks or tables | | | | | |
| Printer stands | | | | | |
| Diskette organizers | | | | | |

(Continued)

WORKSHEET #2 (b)

FURNITURE AND ACCESSORIES

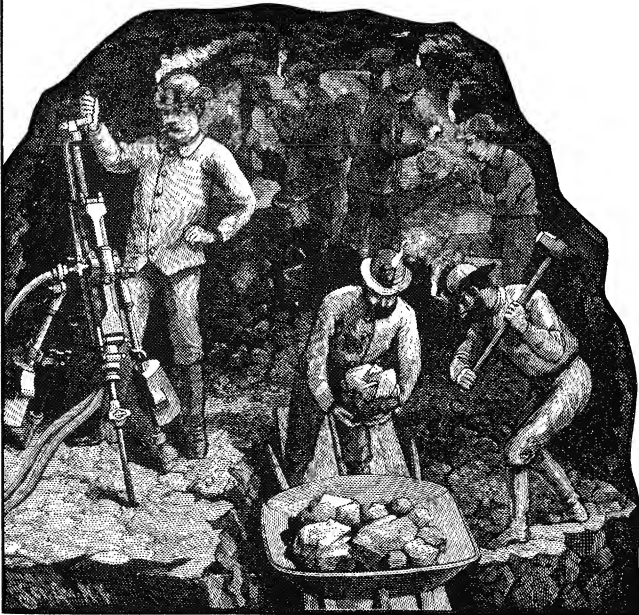
| Check if needed: | Date ordered: | Suppliers name: | Quantity and price: | Date arrived: |
|---|------------------|--------------------|------------------------|------------------|
| Tape racks | | | | |
| Output binders | | | | |
| Copy holders or stands | | | | |
| Anti-glare screens or hoods for CRTs | | | | |
| Fireproof safe | | | | |
| Fire extinguisher | | | | |
| | | | | |
| | | | | |
| | | | | |

WORKSHEET #3**SUPPLIES**

Below is a list of supplies typically needed for a small computer system. Check off the ones that apply to your installation and order them so they arrive before the computer itself. Included is a space to record the name of the supplier and the price information that will come in handy when you reorder.

| | Check if needed: | Date ordered: | Suppliers name: | Quantity and price: | Date arrived: |
|--|------------------------|------------------|--------------------|------------------------|------------------|
| Floppy disks | | | | | |
| Magnetic tape | | | | | |
| Disk packs | | | | | |
| Fan-fold, pin-feed or roll paper | | | | | |
| Preprinted forms | | | | | |
| Printer ribbons | | | | | |
| Replacement print units or daisy wheels | | | | | |
| Cleaning kits for disk drives | | | | | |

How To Minimize The Drudgery And The Danger



Chapter Two

Installing Your Small Computer

Example:

A sporting goods dealer purchased an expensive computer system for point-of-sale inventory control. Unfortunately, he failed to plan for conversion. When the equipment arrived, the dealer discovered that the system would not accommodate his current inventory numbering scheme. Each and every item in his five stores had to be renumbered and reticketed before it could be tracked by the computer. The task took months. Meanwhile, the computer sat virtually unused. The dealer never recovered from this poor start. One year after purchase, he had to give up the computer and return to his manual system, taking a tremendous financial loss.

Example:

A California plumbing supplies distributor abandoned his previous manual system as soon as his new accounts payable program arrived. Unhappily, a programming error caused the computer to print and send each payment twice. By the time the mistake was caught, the firm was out several hundred thousand

dollars. Almost all of the suppliers eventually returned the overpayments, but it took more than six months to track down all the money.

Example:

A construction firm installed a computer system expecting it to be fully up and running in 30 to 60 days. After all, the vendor had promised to install it. But installation, this firm discovered, involved much more than merely unpacking machines and plugging them in. One year later the system was still not 100 percent operational, and even though several applications were finally functional, the staff had had so many problems with the computer that they avoided using it.

The buyers described above underestimated the effort required to install a new computer. They paid dearly for their ignorance. Installation can be traumatic, particularly if you don't get much support from the vendor. Normal operations can be disrupted, "hidden" costs can pile up quickly and the toll in man-hours can far exceed the anticipated investment. Unfortunately your vendor isn't likely to warn you of the horrors that await the unprepared.

But take heart. Our discussions with small computer users indicate that it is possible to ease a computer into a business with a minimum of disruption and a maximum of profit-boosting benefits. First, you must prepare for the equipment as explained in Chapter One. Then, you must plan and carry out a step-by-step installation program. You will find such a program laid out for you in this chapter.

There is one way to avoid the problems—you can simply *lower your expectations!* Are you content to have your new computer sitting idle for many hours of the day? Are you prepared to wait weeks or months before you begin to get full value? If so, you need not bother to plan ahead.

If, on the other hand, your goal is to make the computer pay off as much and as quickly as possible, you *must* have a well-defined plan to ensure smooth installation.

Most of the steps in the plan can be delegated to employees. There are some

tasks, however, that must be handled by top management: taking the lead, setting the pace and following through relentlessly to see that everything gets done.

The installation process has two major phases. In data processing jargon they are **acceptance testing**—checking the new machine to see that it works right—and **conversion**—switching from the old system to the new. Let's review these two phases while considering the role of the manager.



Few small computer buyers have the luxury of time. Most of them must accomplish acceptance testing in a few days.



Acceptance Testing

Acceptance testing is the process of checking the machine upon arrival. Don't confuse it with demonstrations—it is *not* an informal try out. The testing should be as thorough and scientific as you can make it. Your goal is to find out how the system will perform under actual working conditions, and to discover problems before you've made the final payment to the vendor.

If you negotiated a good contract, you should have the right to delay the check for two to four weeks while you test the system under actual working conditions.

Few small computer buyers, however, have the luxury of so much time. Most of them must accomplish acceptance testing in a few days. Ideally, your contract will clearly provide for testing at your site and will define the conditions: "In less than 15 minutes, will process 50 payroll checks, correctly calculating all deductions and overtime exceptions, then print checks . . . etc."

For those of you without such guidance from your contract, we have set forth a typical testing procedure below. You will find its steps summarized in a worksheet at the end of the chapter, with spaces to record when each task has been completed.

The Three Phases Of Acceptance Testing

In general, small computer buyers will have three separate phases to their acceptance testing: (1) post-shipping tests by the vendor (2) hardware "burn-in" and (3) software testing.

Post-shipping tests. Although your computer's components were probably tested at the factory, you should insist that your local vendor assemble and test the system before it is delivered to your site. In many ways, the post-shipping tests will be like the ones run on a component stereo system: Each component is individually tested, then everything is hooked up to see if it works together.

Expect the vendor to check each piece of hardware for obvious shipping damage, set it up and realign it (e.g. the recording heads in the disk drives), then run a complete set of checking programs. Such programs are designed by the manufacturer to pinpoint flaws.

The post-shipping tests are important enough that you should assign someone to verify that they have been carried out. You'll find spaces for this on the worksheet.

Hardware Burn-in. Once the system has been set-up at your office, your next step is to "burn-in" the system. Most computer problems show up within the

first 100 hours of operation. Indeed, more than 90 percent of all failures occur within the first dozen or so hours.

So leave your system running virtually full-time when you first get it. Don't try out your applications programs yet. Instead, run all of the diagnostics programs that come with your equipment. These programs will test the memory and the disk drives. Some computers have such programs "wired in;" others have them as part of the systems software that comes with the machine. Check your manual or ask your vendor. Often you can run such programs overnight, freeing your system for other testing during the day.

Don't be afraid to leave your system running for much longer periods of time than you will when it goes into actual use. Computers have few mechanical components to "wear out." High usage during the burn-in period can show up failures that might not otherwise occur until the system is used close to its limits—and that often occurs *after* the warranty has run out.

Warning: Floppy diskettes are just about the only part of a computer system that might be damaged by the burn-in process described here. If diskettes are left in the drives overnight for several nights, they could fail. Never use an original disk for such tests. Use duplicate copies that you can afford to lose.

All other components, including hard disk drives, can freely be left on for long periods of time to stress them to their limits.

Software testing. The final phase is to test the software, including all subprograms, to see that it performs as promised. Make all the tests on *your* hardware using *your* data.

Although you will probably be installing your applications one-by-one, you should test all of them upon delivery. In most cases, it's not practical to enter all of your records into the computer just to run the tests, since data entry can take weeks. You will probably have to budget some time to develop sample data and test-case transactions. You can "invent" data or, better yet, use a portion of your actual company records.

If you test your programs using company data, be sure to use duplicate data, not the originals. The program bugs you discover may cause data loss. Make sure you have plenty of backups for every file and program. (Chapter Three will assist you in learning how and what to backup).

Although it's sometimes a hassle to simulate actual conditions, such tests can spot trouble areas that would cost a bundle if left uncorrected. Far too many computer users have skipped testing and spent days or weeks keying in their data, only to see that time goes down the drain because of an unexpected flaw in the software.

After entering the test data, run each program through its entire cycle. Briefly try out each option and menu choice. Ask for a printout of every possible report. Simulate month-end, quarter-end and year-end closings.

As you step through each program, look for these things:

- Does it perform each function as promised and as set out in the manual?
- Does it keep accurate records? Are all amounts posted to the correct accounts? Do they agree with one another? Do they balance?
- Is it safe? Are there safeguards against unauthorized access to sensitive programs and information?
- Is it fast enough? Will it be able to handle your full workload in a reasonable amount of time?

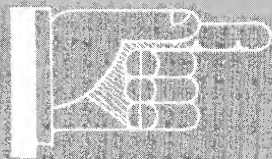
After trying to use each sub-program correctly, you should make some deliberate mistakes to see how the program reacts.

Do everything you can think of that a naive clerk might do. Hit the wrong keys. Put too many numbers or letters on the screen. Put too few. Put letters where numbers belong, and vice versa. If the menu shows only six choices, ask for number seven. Abort the program in midstream to see what happens.

It's a valid—and *vital*—part of software testing to do everything you can to

make the program fail. Take careful notes as you try to “crash” the system so you can duplicate the recovery procedures if you make the mistake in real life. You may eventually want to incorporate your discoveries into an instruction manual you prepare yourself. (You will find such a manual described in more detail in Chapter Three.)

And what if you and your vendor don't agree on the results of the tests?



CONSUMER ALERT

Resolving Vendor Disputes

This chapter explains acceptance testing, but assumes that any problems you discover will be quickly and cheerfully corrected by the vendor. But not every vendor is so easy to get along with. You could have serious disagreements.

Your best defense against disputes is a carefully worded contract with a clear definition of what the vendor is required to deliver. Unhappily, not every buyer protects himself with a clearcut document. Occasionally, vendor and buyer just don't see eye-to-eye and the contract doesn't spell out who is right. If that happens to you, don't rush out to institute court proceedings. There may be other, less drastic steps you can take first. Legal fees and delays often make both sides losers in a lawsuit, no matter who wins the judgement. Legal proceedings should usually be a last resort when you have exhausted other alternatives.

What steps should you take in the event of problems? Each case is different so you may want to get legal advice early, but it's almost always a good idea to document

things right from the start. Log in dates, times and descriptions of all difficulties. Keep records on the vendor, paying special attention to when representatives showed up to help and what they did to solve the problems.

Naturally, you should keep all letters and memos, but you should also document oral requests and promises made by both sides. Take notes during meetings and phone calls. Refer to your notes and summarize them at the end of your conversations to make sure that both of you understand each other. Oral promises are more difficult to enforce than written ones, but they can be used to your benefit during negotiations or, if necessary, in court.

After documenting the problems, give the vendor written notice, and ask for a response in writing. An early written record may come in handy further down the road if legal proceedings are required. In the meantime, it alerts the vendor that a serious problem exists.

In your letter, try to define the issues narrowly and objectively. "The system doesn't work right," is too broad a complaint. On the other hand, "The job costing program does not integrate with the payroll program as promised on page three of the contract," is a clearcut issue to which the vendor can make a specific response.

If careful documentation and written notification fail to get you the results you want, it may be time to go over the local vendor's head (if possible). Know the vendor's chain of command and don't hesitate to use it if warranted. Write to the president of the company at the head office, sending a copy to the local representative. Don't be timid about asserting your rights. It may be that only top management has the authority to resolve your particular problem. You can lose valuable time if you delay contacting the proper people in the vendor's organization.

If you still cannot reach an agreement, you may want to ask your attorney to contact the vendor. He should not confront the other side yet, or alienate them through threats. At this stage, you simply want to alert the vendor that he can not get rid of you by ignoring you. Attorney involvement will sometimes spur the vendor to take your complaints seriously.

One More Chance

Still no resolution to the conflict? Don't file suit yet—you still have one possible alternative: Arbitration. If your contract has an arbitration clause you can insist on it. If not, it can occur only with the consent of both parties.

Arbitration avoids the formality, time and expense of court proceedings. Usually, one to three arbitrators hear the evidence and render a judgement. But arbitration has its drawbacks, not the least of which is that it can be very difficult to overturn an unfavorable decision. Your ability to appeal is limited. If large amounts of money are

involved, you will probably not want to take the risk of arbitration.

If arbitration won't work and you can't come to an agreement, you have finally reached the point where you must make a decision on filing a lawsuit. Ask your attorney to help you narrow the issues and objectively evaluate your chances of winning. Make sure that you have a strong case on legal—not just moral and ethical—grounds. And, before beginning, ask yourself if you have the stamina and the financial resources to fight it out to the end. If not, you may be better off writing off your losses and getting on with business.

Conversion

Before you can put your new computer to work, you must transfer your organization's information into the computer. Generally, small computer users must convert a portion of their existing information and also develop some new information. Then, at the moment of activation, they enter current amounts and balances to bring the system up to date. This conversion must be carefully timed; thereafter the files must be periodically updated so the computer has accurate information to work with.

Usually you will want to convert your data in five stages: (1) planning and scheduling; (2) data entry; (3) operator training; (4) parallel operations of the old and new systems; (5) evaluation. These stages are outlined below. The worksheet at the end of the chapter summarizes the steps you must take and provides spaces to record when each task has been completed.



Remember that your staff's regular workload will continue when the computer arrives, so conversion will mean overtime, weekends at the office or hiring temporary help.



Planning And Scheduling

Many of the jobs outlined in this section should be started, or at least assigned and scheduled, before the computer arrives. Remember that your staff's regular work load will continue, so conversion will mean overtime, weekends at the office, or hiring temporary help.

If you develop a good plan, conversion becomes a simple matter of mechanically following that schedule. Failure to think ahead, on the other hand, can lead to serious blunders, or even to a false start from which you may not recover. If the switchover to the computer collapses, you will lose money, time and the confidence of your staff, whose natural fear and skepticism could mushroom into genuine computerphobia.

Plan carefully for conversion. With the help of your vendor and the worksheet at the end of the chapter, break each activity into distinct segments. Assign the responsibility for each one to a single individual. Although that person will probably need help, he or she will be the "ramrod."

Don't make the error of failing to discuss your decisions thoroughly with the employees who will be expected to implement those decisions. Certain individuals may not have the time, interest or ability. Doing your regular job and then working evenings is an unwelcome prospect—and even more so if it has been “dropped in your lap.”

As you plan, try to schedule the conversion in easy-to-swallow stages. Don't try to start up five different programs on Monday morning. Begin with one that is relatively easy to implement and that offers obvious benefits to your staff. Once they have become comfortable with this first program, you can move on to more complex software.

Payroll and word processing are often good places to start. Both are easy to install yet provide the kind of dramatic time-savings that can win computer converts among your employees. Inventory control, accounts receivable and accounts payable are usually good choices for the second stage. When these have been thoroughly converted, you can move on to programs whose major benefits are for management: general ledger, sales analysis, job costing, etc.

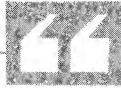
Turn your conversion plan into a schedule with start dates, progress reviews and completion dates for each task. Post it where employees can follow along.

Data Entry

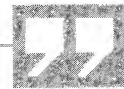
Once you've made a schedule, you are ready to begin keying data into the computer. Your new computer system will require a great deal of information that needs to be entered just once, such as names and addresses, current balances, stock on hand, etc. Certain applications will also need historical data for comparisons.

You must plan how and where to find this information. Don't wait until the computer is sitting in your office to start the job of, for example, going through old records to get sales totals from previous years or culling through index cards

to get current addresses. Have the data collected and ready to go when the computer arrives.



Your new computer system will require a great deal of information that needs to be entered just once. You must plan how and where to find this information.



Failure to get accurate data can negate the value of the computer. If, for instance, you install your new machine in the middle of the year, you may have to go back through six months of invoices to find the necessary sales information. That could be an enormous task. If you don't do it, however, you can't make detailed year-to-date comparisons for the remainder of the year, nor can you make year-to-year comparisons next year. That means waiting 18 months before you start getting the valuable management reports the system can deliver.

With advance planning, you might have been able to institute a manual system to capture and record the information as it occurred. Or you could have contracted with a service bureau to handle the task with the understanding that it would deliver the information on magnetic tape. Or you could have been prepared to hire temporary help for a brief period to get everything into the new computer.

Expect Data Entry Mistakes

Your new, untrained operators are bound to make some mistakes, so be prepared for data entry errors. If you have large amounts of data, divide the material into small batches, each with its own control total. Small batch control totals help localize errors for quick correction.

Sometimes the vendor can help with conversion by designing a special data entry program, or by supplying certain information on tape. For instance, in the motorcycle parts industry most manufacturers will supply computer tapes listing all their parts numbers and descriptions. If the vendor can design a program to read these tapes into your system, a dealer has only to tell the system how many of each part he has on hand. Without such a program, the data must be manually entered using complete descriptions of more than 9,000 parts.

Operator Training

Because operator training should begin before the computer arrives, we discussed it in the previous chapter. The conversion period provides an excellent opportunity for operators and back-up personnel to get familiar with the computer. As with all parts of the conversion process, schedule training in small, easy-to-digest segments.

Parallel Operation

Parallel operations means running the new computer side-by-side with the existing manual system, then comparing results. Parallel operations allows you to solve problems in the new system without pressure—if the computer fails, the manual system will still get the work done.

Despite the importance of running in parallel, it can be a trying time. It puts a tremendous burden on your staff. They are expected to master the new computer and process a full workload with it, all while keeping pace using the old system.

Moreover, some systems can't be run in parallel. Maybe the computer is doing something never done before. Or maybe doing it the computer's way precludes using the manual method. You couldn't, for instance, order two sets of merchandise just to see how well your inventory control program calculates economic order quantity.

So you may have to simulate a parallel operation on paper, or put in some overtime during this period. Initially you should use your manual method for business while you test the computer information for accuracy. For instance, it is vital to check the first batches of computer generated bills, invoices or checks. Errors here could seriously affect your relationships with your customers.

The initial parallel processing period will be a chance to make mistakes without worrying that they might bring the entire company tumbling down. After you feel reasonably certain the computer is working properly, you can begin using the machine for business, but you should still use the old system as a check.

If you can handle the extra work, run in parallel for at least one full month with the computer as the backup, then two more months using the computer to do the work and the manual system as a check. At the very least, run parallel for several weeks prior to your normal month-end closing. Before you convert entirely to computer, run at least one month-end, one quarter-end and one year-end report, even if you have to simulate actual closings. Some programming problems don't show up until the closing reports.

Evaluation—Don't Forget It!

Many computer users are tempted to skip this final stage of the conversion process. The attitude seems to be "It's too late now, so why bother?" Most problems, however, can be solved if users take the time to pinpoint them precisely.

Grade your new system after each application is brought on board. At least

twice a year thereafter, sit your staff down and evaluate the entire system. Find out what they need to work more efficiently. Ask them to make out a "wish list." And give some thought to the reports and enhancements you would like to see at the management level. Often you can improve your system with a minimum of reprogramming, or even by changing manual procedures. It may be something as simple as adding a report, retraining operators or redesigning a form to add a tear-off stub. An annual review is one of the simplest, most effective means of ensuring that you are getting the most for your computer dollars.



IDEAS YOU CAN USE



How To Make Installation Easier

- Many industries use standard nomenclatures, standard numbering systems or similar information. In many such cases, you can obtain this information on computer tapes to be read into your new computer system, saving you the time of entering it manually. Examples include:

- Automotive parts
- Census tract data
- Book publishing codes
- Commodity prices and historical information
- Diagnostic and procedure codes for health care professions
- Drug codes and drug interaction files for pharmacists
- Mailing lists
- Motorcycle parts
- Stock prices and historical information

Check first with your vendor to see if such tapes can be provided free of charge or at a reduced price. If not, call suppliers and trade organizations, many of which provide this service at a low fee. And if you still can't find what you need, shop around for a company similar to yours that might sell it to you.

- Some programs are not geared for large scale data entry. They may work fine for an occasional update but bog down hopelessly when you try to type in hundreds or thousands of items at one time. Don't settle for a laborious data entry process unless

you have no choice. Your supplier may have, or be able to develop special conversion programs to speed the process. Such programs allow you to enter data quickly in large batches, or to read it from outside sources into your machine.

- The conversion period is a great chance to do the housekeeping you've been putting off. You can weed out inactive customers, update addresses and phone numbers, clear out dead inventory and so on. Don't load a clean machine with dirty data.
- If possible, key in your data before the computer arrives. Not only will you eliminate a time consuming bottleneck, but your staff will have a chance to get familiar with the equipment and make a few mistakes before they really count.

If you can get your hands on the software early, you can often rent a computer or a terminal while waiting for your hardware to arrive. Or you may be able to arrange for the loan of a demo model from the vendor. Or perhaps a nearby user will let you borrow or buy off-hours time on its machine. Likewise, you may be able to convince the vendor to let one of your employees use a computer in the showroom when it is not scheduled for a demonstration.

- Many small computer users find they need temporary help during conversion. Although you can always turn to the standard temporary help agencies, most metropolitan areas have one or more data entry services that specialize in converting manual records to computer. Most of their work comes from large corporations, but they are sometimes willing to take on jobs for small computer users. The cost of such a service is sometimes less than the cost of paying your own staff's overtime. Ask your vendor for recommendations.
- If parallel processing is too expensive or difficult, you may be able to check the accuracy of the new system by installing independent data controls. These controls should be balanced frequently so problems will be picked up early. Your accountant should be able to suggest appropriate ways to audit the computer.

Ideally, your accountant should be involved in selecting the software. At the conversion stage, however, the accountant's role is to help you verify that (1) you got what you were promised and (2) it is working correctly.

WORKSHEET #4 (a)**ACCEPTANCE TESTING**

Try to accomplish all of the tasks below before making final payment to the vendor. Refer to the chapter for further details.

VENDOR POST-SHIPING TESTSAssigned
To:Date
Completed:

| | | |
|-------------------------|--|--|
| Central Processing Unit | | |
| CRT | | |
| Floppy Disk Drive | | |
| Hard Disk Drive | | |
| Serial Interface | | |
| Modem | | |
| Printer | | |

HARDWARE BURN-INAssigned
To:Date
Completed:

| | | |
|-------------------------|--|--|
| Central Processing Unit | | |
| CRT | | |
| Floppy Disk Drive | | |
| Hard Disk Drive | | |

(Continued)

WORKSHEET #4 (b)

ACCEPTANCE TESTING

Assigned
To:

Date
Completed:

| | | |
|---------|--|--|
| Modem | | |
| Printer | | |

SOFTWARE TESTING

Assigned
To:

Date
Completed:

| | | |
|--------------------------|--|--|
| Application #1 Title: | | |
| Application #2 Title: | | |
| Application #3 Title: | | |
| Application #4 Title: | | |
| Application #5 Title: | | |
| Application #6 Title: | | |
| Application #7 Title: | | |
| Application #8 Title: | | |

WORKSHEET #5 (a)**CONVERSION**

Photocopy this worksheet and use it for each application you convert to the computer. You may also want to create charts for each conversion for posting where employees can see who has been assigned responsibility, when it will begin, when progress reviews will be held and when it is scheduled to end. Refer to the chapter for further details on specific activities.

Application: _____

PLANNING AND SCHEDULING

Assigned
To:

Date
Completed:

| | | |
|--|--|--|
| Break projects into segments | | |
| Assign responsibility | | |
| Assign start date, progress review dates, completion dates | | |
| Create chart for posting | | |

DATA ENTRY

Assigned
To:

Date
Completed:

| | | |
|--|--|--|
| Determine data needed | | |
| Determine source of all data | | |
| Collect data (source documents, summaries, etc.) | | |
| Divide into batches with control totals | | |
| Key in data | | |

(Continued)

WORKSHEET #5 (b)

CONVERSION

TRAINING
(See previous chapter for details.)

Assigned
To:

Date
Completed:

| | | |
|----------------------|--|--|
| General introduction | | |
| Manual procedures | | |
| Operating basics | | |
| Software specifics | | |

PARALLEL OPERATIONS

Assigned
To:

Date
Completed:

| | | |
|---|--|--|
| Manual system with computer as backup | | |
| Simulate closing reports | | |
| —Daily | | |
| —Weekly | | |
| —Monthly | | |
| —Quarterly | | |
| —Yearly | | |
| Switch to computer with manual as backup | | |
| Switch totally to computer | | |

(Continued)

WORKSHEET #5 (c)**CONVERSION****EVALUATION**Assigned
To:Date
Completed:

| | | |
|---------------|--|--|
| First Review | | |
| Second Review | | |

OTHER TASKS
(Fill in as needed)Assigned
To:Date
Completed:

| | | |
|--|--|--|
| | | |
| | | |
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*You'll be over the
edge if you don't
plan ahead for
every possibility . . .*

Section II:

| | | |
|--|---|--|
| 3 A Crash Course In Maintaining Your Small Computer | 4 Crime-Proofing Your Small Computer | 5 Disaster Planning Made Easy |
|--|---|--|

How To Protect Your Small Computer Investment

Section II contains a collection of information never before brought together in one place. It details the problems owners face when using their small computers in daily business life. If it did nothing more than warn of these difficulties, this section would be useful, but it goes on to suggest solutions, as well.

For instance, Chapter Three, **A Crash Course In Maintaining Your Small Computer**, is full of no-nonsense techniques to make your computer run smoothly. In the past, some computer owners have ignored operating basics assuming that the methods were just common sense. They soon learned the error of their thinking, however, when some "trivial" matter that had been overlooked brought the entire system to a halt. Chapter Three contains important tips you need to know about maintaining your small computer—tips that most users learn the hard way.

Chapters Four, **Crime-Proofing Your Small Computer**, and Five, **Disaster Planning Made Easy**, deal with more subjects you may not have heard mentioned. Many people prefer to pretend that computer crimes and computer disasters don't exist. Unfortunately, they *do* exist . . . but your business may not if you fail to protect yourself against the dangers. Happily, it often doesn't cost any more to do things the right way, as you will learn.

Chapter Three

*Here's The Recipe
For Success*

A Crash Course In Maintaining Your Small Computer



Sales representative to buyer: "The beauty of this small computer is that anyone can operate it! You don't need any special training or know-how. Just read your instruction manual, plug it in and start saving time and money!"

Enter The Piece-of-Cake Myth.

Buyer to sales representative (four months later): "And it ate my accounts receivable disk and now I don't know how much anyone owes me. *What do you mean I should have kept a backup?!?* When can you fix the disk drive? *What do you mean I should have bought a service contract because the warranty has expired?!?* And I can't remember how to recover from errors. *What do you mean I should have taken notes?!?*"

Exit The Piece-of-Cake Myth.

And exit your peace-of-mind if you are a new computer owner who believes small computers are as easy-to-use as an electric typewriter. You'll never get your

money's worth until you master the basics of operating a small computer. But if you learn proper operating procedures, you may be able to have your cake and eat it, too. You may be able to get the benefits of computer ownership without the headaches and hassles of learning all your lessons the hard way.

What's the recipe for success? The major ingredients are outlined below. Over time, users have learned techniques to smooth the day-to-day operation of a small computer. We will pass along many of those money-saving techniques in this chapter.

Why are these operating tips important enough to justify a chapter of their own? The more you come to depend on a computer, the greater the chance that operating mistakes could damage your business. You bought your small computer so it could handle many of the most important jobs in your business. But what happens if the machine runs at reduced efficiency or breaks down completely?

It's no exaggeration to say that the profitability, perhaps even the survival, of your business could someday depend on your computer know-how. You don't need to understand the internal workings of your equipment, just as you don't need to know what's under the hood to drive a car. But every car owner should know when to get a tuneup and how to change a flat. Likewise, every computer owner should understand the machine's operating basics. We have divided those basics into four sections: (1) preventive maintenance, (2) problem recovery, (3) backup and (4) service.

There are several ways you might want to use this chapter. Management can read through to familiarize itself with smart operating procedures to do a better job of supervision. This chapter might also be used as training material—everyone who uses the computer should know the basics outlined here. And some of the guidelines and worksheets from this chapter are suitable to be photocopied and posted near the computer as reminders.



Given the inherent reliability of small computers, one of the major causes of failure is poor housekeeping and lack of maintenance.



Preventive Maintenance—Do It!

The first step in getting more from your computer is learning how to keep it running. Given the inherent reliability of small computers, one of the major causes of failure is poor housekeeping and lack of maintenance.

Don't wait for your computer to "go down" before you pay any attention to it. Regular computer care can save you plenty of grief. Dirt and dust are even more fatal to a computer than they are to a stereo system's records and needles. If debris accumulates in disk drives, for instance, it causes loss of data and, eventually, mechanical failure. Here are some hints on caring for a small computer.

Select A Good Location. Obviously, you should select a site for the computer that's reasonably clean. And once you've got it in place, eliminate as many niches and dust-gathering corners as possible. Buy a vacuum cleaner and use it regularly, particularly in and around the printer, which generates paper dust.

Pay Attention To Peripherals. If the computer's environment is suitable, most problems will occur in the peripheral equipment—the disk drives, tape drives, printers, etc. These are electromechanical devices that wear, stick and

bind. Here is where preventive maintenance really pays off.

Schedule Routine Maintenance. Although some owners leave everything more complicated than cleaning to service technicians, you can do other things to keep your unit in top notch condition. These tasks don't take a lot of time or a crash course in computer servicing, either. With service costs skyrocketing, it's a good idea to do as much of the maintenance work yourself as you can.

In addition to routine cleaning and housekeeping, schedule at least an hour of preventive maintenance each month. Here are some of the things you should accomplish:

- Clean printer units, printer heads, tractor-feed units
- Clean all disk drive heads using special cleaning kits
- Clean all tape drive heads using cleaning kits or manually using special cloth and cleaning fluid
- Clean exterior of disk drives and tape drives, including metal hubs to keep oil and debris from accumulating
- Check air filters and replace if necessary (not all units have filters)
- Clean keyboard and CRT screen (use a CRT cleaner, not Windex!)

Use Diagnostic Programs. Previously used exclusively by repair personnel, diagnostic programs are now available to end users. Used properly they can save you needless service calls.

Some small computers have diagnostic programs wired in or available as part of the operating system. In other cases, you must purchase them from outside suppliers. A full-scale maintenance program will test your computer and all of its peripherals: read only memory, random access memory, tape drives, disk drives,

video and printer. You can also buy separate programs for each component. Regular use of diagnostic programs lets you to spot problems before they cause an expensive system crash.

Caring For Media. Another important facet of preventive maintenance is to properly store and care for your magnetic media. Static electricity often ruins diskettes. Another common reason for system failures is damage or contamination of diskettes or tapes. Below you will find a checklist of do's and don't's for the care of your media. Review them for your own knowledge, then give them to operators or post them near the computer as a reminder.

The Do's Of Magnetic Media . . .

Do return diskettes to their envelopes and tapes to their containers. Don't leave them laying about to collect dust. Even tiny dust particles can scratch the oxide medium when it passes underneath the head.

Do carry diskettes, tapes and cartridges with care. Cradle cartridges under your arm. Carry disk packs by handles. Be careful not to squeeze or crimp diskettes and tapes.

Do use only a felt-tipped pen to write softly on diskette labels. Pressure from a pencil or ballpoint pen can easily damage a diskette.

Do replace labels rather than erasing and reusing old ones. The pressure of erasure may damage a diskette. And no matter how careful you are, eraser or paper particles are almost certain to contaminate the diskette or tape.

Do store diskettes safely away from excess heat (above 110 degrees) and away from magnetic fields. Many electric devices, even telephones, produce small magnetic fields.

Do store diskettes and tapes on edge, in dust-tight containers. Never lay them flat or on top of each other.

Do allow a disk pack or cartridge to become accustomed to the prevailing temperature and humidity by placing it in the computer room at least 24 hours before use.

. . . And The Don't s Of Magnetic Media

Don't smoke in the computer room . . . *ever*. Airborne smoke, ash and tar will stick to heads, diskettes and tapes and ruin them.

Don't start up the computer with a diskette in the drive unless the manufacturer specifically recommends it. Stray magnetic fields generated by the drive's motors may alter or erase the data on the diskette. Turning off the computer with a diskette inside is usually a bad idea, too.

Don't force a diskette. If you encounter resistance when inserting it into the drive or into its storage envelope, back out and try again.

Don't bend a diskette. The oxide coating can crack and fall off.

Don't touch the surface of the diskette or tape. Fingerprints can permanently destroy data. Be particularly careful around the access slot in diskette jackets.

Don't stack disk packs or tape reels on top of one another. They can slide off and fall, causing platter misalignment or damage to the media.

Don't paper clip a diskette to a report or printout.

Don't lay diskettes on metal filing cabinets or desks. Static charges can build up or be transmitted by the metal, wiping out the data.

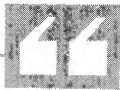
Problem Recovery—Prepare For It . . .

Breakdowns are inevitable, even with a computer that has been given a good home and loving care. The more you know about your system, the easier it is to bail yourself out of such emergencies. Although you don't have to understand enough to qualify as a computer technician, a little basic know-how and some common sense can minimize the consequences of system failures.

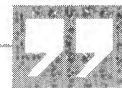
At some small computer installations, a problem means that everyone takes a break and waits for the service rep to show up. The attitude is that nothing can

be done by the in-house staff. Yet if you have a systematic program for problem recovery, you will discover that you can handle a good portion of your system failures on your own.

One way to help yourself is to make sure you and your operators understand all the error codes. Each program will have its own codes. Moreover, the operating system will generate error codes upon occasion. Learn what these mean and how to recover from each one. A certain type of error, for instance, may signal a possible problem with a disk drive. If your operator understands this and reports the error message, you can take preventive maintenance steps immediately.



Breakdowns are inevitable. The more you know about your system, the easier it is to bail yourself out of emergencies.



If a failure occurs, make a note of what you were doing when the problem occurred and try to get the program up and running again. Before you do anything, however, make sure you have copies of the master program stored away in a safe place. If there is indeed a problem, it could wipe out your program as well as your data. Usually, the best procedure is to close the files, rerun the program and try to return to where you were. If disk files were open, closing them will usually prevent information from getting lost. Although you will have to check

your owner's manual, on many systems this involves hitting the "break" key then typing the word CLOSE. Alternatively, you may be able to return to a master menu that has a "Close files" or "End" option. Then start the program all over again and try to get back to the point where the problem developed. After getting the program on-line again, check the last few items you typed in before the crash to make sure they were stored correctly.

If you can't get the program up again, or if it crashes repeatedly, you may be faced with a software bug or a hardware problem. But don't call for service yet. When problems occur, that person should check for simple causes:

- an unconnected plug
- a blown fuse
- switches on wrong settings

Still no luck getting the program up and running properly? Try calling the technical "hot-line" of the software and hardware vendors. Chances are they can pinpoint the cause over the phone.

If none of these measures work, run your diagnostic programs. Although these programs are primarily preventive tools, they can also help you spot hardware problems. If, for example, you can isolate a single disk drive as the offender, you may be able to work around it while waiting for service.

The suggestions above refer to minor system failures. For tips on coping with large-scale calamities, refer to Chapter Five on disaster recovery.

The Importance Of A Problem Log

No matter what the problem, the most important thing the operator can do is observe and write down exactly what happened. If the service representative must be called in, an exact description will be needed so the cause can be tracked down.

Since history repeats itself, we suggest that you keep an ongoing problem log for your small computer system. Operators should make an entry in the log for every problem, even those solved without outside help. New operators can then benefit from past mistakes by referring to the log for recovery techniques.

Your problem log will grow in size and usefulness over time, but you can get one started as soon as you get the system. We suggest you divide it into sections, one for each program (including the operating system) and one for the hardware. At the front of each section should be a list of all error codes for that program, the meaning of the codes, and actions that should be taken to correct the error. At first you will simply copy down the explanations from the software documentation, but as time goes by you will want to add notes of your own.

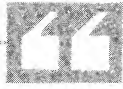
Each time a problem occurs, write down the important facts and file it in the appropriate section. You can photocopy the sample page at the end of the chapter, or make up your own forms. Keep the log near the terminal, and insist that operators get in the habit of keeping it up to date. It will pay big dividends further down the road.

IDEAS YOU CAN USE

Some Operating Tips

- Color code your source documents, program labels, program documentation, backup labels, filing cabinets and storage areas. This simple step can greatly reduce confusion and cut down on operator errors.
- Although not everyone is capable of tackling computer repair, some computer users may have an individual on staff who is capable of minor board-swapping repairs. Ask your vendor if this service training is available.

- To the extent possible, remove shelving, pictures, draperies and other dust-catchers from the computer room.
 - When printer ribbons become too worn for use with correspondence or important reports, save them for use with non-essential reports, sample runs and paper backups of long documents such as inventory lists. And some brands can be re-inked at a substantial savings over new ribbons.
 - You can save a few dollars in paper expense by reusing discarded printouts as scrap paper. Cut them into small size and bind one edge with rubber cement to make a handy desk pad. Large operations can bundle their discarded printouts and sell them to salvage operations. **Warning:** sensitive documents should be shredded. Since many printouts don't have to be permanently saved, many people use both sides of their fan-folded paper. Simply save discarded printouts and print out your next non-essential report on the reverse.
 - When storing archival records such as tax information, mark the destruction date clearly on the front of the file or diskette. Remind clerks to periodically remove and discard outdated materials.
 - Get a complete technical service manual for your computer. If you switch to a third-party maintenance company somewhere down the road, the technician will need the manual to take on the job.
 - When you receive updated versions of your packaged programs, or if you pay someone to make modifications, don't forget to update the backup copies and documentation you keep off-site. Clearly mark the version of the program on the front of the diskette, so operators don't accidentally use the old version.
 - On-site service charges are so high today that it is often cheaper to stock extra components. The additional cost pays dividends when a part fails and you are able to continue operating with the spare while getting the original repaired using cheaper carry-in service. Most small computer owners should seriously consider getting one extra disk drive. Consider a backup printer, too. The standby doesn't have to be as fast or fancy as your normal printer, just good enough to get you by for a few days.
- It's sometimes possible to cut the cost of a service contract 25-50 percent by specifying carry-in service for printers and disk drives and buying standby units. No service contract can match the speed and efficiency of simply plugging in a substitute component.
- Teach operators to mark their place on the input document each time they finish entering information, make a backup, or have to stop because of a problem. It's not uncommon for operators to lose their place otherwise.



An adequate backup system helps guarantee that your business will survive both human and machine failures.



Backup—What It Is And Why It Is Important

Despite your best efforts at in-house maintenance, your computer is going to fail from time to time. When it does, it may cause the damage or destruction of important business information. In such cases, you must depend on your backup—a copy of your work to be used if the original disk fails.

Most people working with computers for the first time don't understand the importance of backup. You can waste days or even weeks if an original disk gets "sick" and you have no backup copy. Backup is even more crucial if non-technical operators will be using the equipment. More than one owner has lost hours of work because a new operator mistakenly wrote over an important program or made some other error.

An adequate backup system helps guarantee that your business will survive both human and machine failures. Moreover, you may be required by law to keep backup copies of some of your records. The Internal Revenue Service has regulations that apply to all businesses. Other government agencies have record retention rules, too. Here are some of the types of records you may be required by one agency or another to save in machine-readable form:

- Accounting
- Administrative and Personnel
- Advertising
- Insurance
- Legal
- Plant and Property
- Purchasing
- Research and Development
- Sales and Marketing
- Tax Records

Some professions have special requirements. Doctors, dentists, pharmacists, bankers and insurance companies are among the professions that are sometimes required to save their machine-readable records. Your accountant can help you work with the IRS and other agencies to determine which files should be saved and for how long.

Backup—How To Do It

Each company will have to decide for itself just what records must be backed up and how long they must be saved. Once you've determined what to back up, you must learn the right way to go about it. The first step is to find a place to keep your backup copies. To ensure file security in case of fire or other disaster, off-site storage is a must.

Although there are installations around the country that provide special vaults for computer files, most small computer users can get by with a bank safe deposit box or a fire-resistant safe at the owner's home. Some of your programs and files will have just one backup located off-site. Many of your programs, however, will need multiple backups. In these cases, you may want as many as four storage locations: one off-site as explained above, another near the computer, another on-site but in a fire-resistant enclosure away from the computer, and yet another for archival storage of tax records and other similar information that must be kept for many years.

When To Back Up Programs

Backup is an important habit to acquire. To begin a backup program, every small computer owner should make duplicates of all programs, data files and their documentation. Store the master disks and the photocopied documentation safely off-site. Never use the master disks for anything but making copies.

Non-essential programs and files can be backed up once per week. If you use standard paragraphs and letters for word processing, for example, you will save new letters as you create them. At the end of each week, you should make a backup copy of all new letters and place it in your off-site storage.

For important programs and information—accounting, inventory, order entry, patient records and so on—we recommend daily backup using a four-disk method. No matter how much trouble it seems, save your work before you leave each night by backing up every important program used that day.

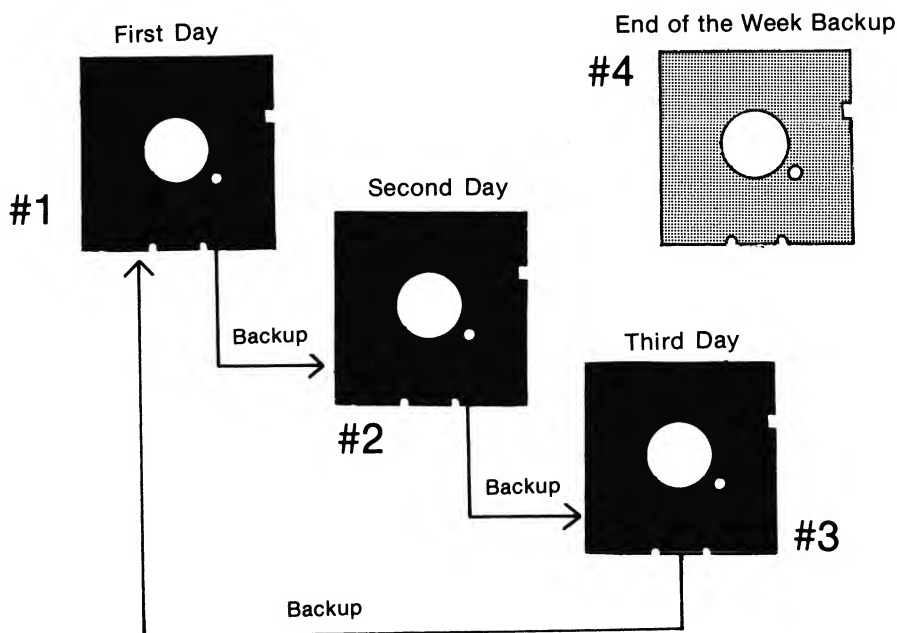
Here's The Best Way

Start by making three backup copies of the master program (the fourth one comes later). You can refer to these disks as #1, #2 and #3. Return the master disk to its off-site storage.

Begin the first day using #1 as your working copy. At the end of the day, back it up onto #2. Make a notation on the sleeve of the job title and the date. Each time you backup a disk, mark the date on the sleeve so you will know just what is on the backup disk if it has to be used.

Begin the second day using #2 as your working disk. At the end of the day, back it up onto #3. The following day you will use #3 as the primary disk and back it up onto #1. Continue rotating the disks. If both of yesterday's disks fail, you will still have a copy from the previous day. You will lose only one day's data. For programs that use more than one disk at a time you must repeat the same procedure for each disk.

At the end of the week, make a backup of the last disk in use, and store this fourth disk off-site with the master program. Once a week, you will bring your disks from their off-site storage to be backed up. If disaster strikes, or if an operator makes a mistake that fouls up all your on-site backups, you will be no more than one week behind.



Even if you use a system like the one described above, you should not rely entirely on your computer system. Use printouts to provide paper backups of crucial information. For instance, you should have a complete set of books that do not reside in the machine. At a minimum, make copies of the ledger accounts each month, and of all quarter-end and year-end reports.

You should also have paper backup of your crucial lists: customer lists, inventory lists, etc. Make a printout after the initial entry into the computer, then at least once per year thereafter.

What About Hard Disks?

Hard disks need backup, too, no matter what the manufacturers claim about

reliability. Unfortunately, most small computers with hard disk drives don't have any good backup options. Using floppy disks can require from 20-300 disks. If you keep more than one backup copy, costs begin to mount severely.

If you own a hard disk, you may be able to get by with backups for your immediate jobs only. Customer lists and inventory lists can be backed up once per year with paper printouts. Another lower-cost option is to use some type of tape drive or cartridge for backup. If your system has this option, you may want to compare it to floppy-disk backup to see if it has cost advantages. Generally, tape is cheaper and easier than using multiple floppies.

Regardless of cost or difficulty, it is absolutely **essential** to back up your hard disk. It is a fact of life that these units do fail occasionally. When a hard disk goes down and must be repaired, all its data is usually lost.



Most first-time users don't get a grip
on the service problem early enough.



Service—What Are Your Choices?

No matter what the size, no matter who the manufacturer, no matter how carefully you maintain it, you will never find a computer so trouble-free that it doesn't need periodic service. Arranging for reliable maintenance is one of the

most important aspects of computerization—and one of the most overlooked. An ailing computer can bring your operations to a screeching halt. It's essential to have a good service contract that provides timely repairs when breakdowns occur.

Most first-time users don't get a grip on the service problem early enough. They get through the infant stage just fine, when they are covered by their warranties and when the system doesn't have many problems. Their first unpleasant surprise comes 6 to 12 months down the road. Ironically, that's just the time they are getting more dependent on the machine. When the computer shuts down, everything shuts down.

Some users overlook service contracts until it's too late; others overpay. Before contracting for service, you should consider your options carefully. We have laid out those alternatives for you below. Along the way, we have passed tips on getting more for your maintenance dollars. At the end of this chapter, you will find a Consumer Alert that sets out the do's and don'ts of selecting and contracting with a service company.

Some Questions . . . And Answers

Most small computer users will want to consider these questions: (1) Am I contractually required to use a certain company? *If not:* (2) Can the manufacturer provide a good service organization? *If not:* (3) Can the distributor or dealer suggest a good service organization? *If not:* (4) Can I locate a good local third-party maintenance company on my own?

Although most users will go through the process in this order, some of you may want to "skip" a step. For example, you may want to look into hiring a third-party maintenance company (abbreviated TPM) even though the manufacturer provides local service. Ask yourself . . .

Am I contractually bound to use a certain company? Many lease contracts bind you to service from a specific vendor. Example: Tandy

Leasing Company, which leases Radio Shack equipment, requires any lessee located within 75 miles of Radio Shack service center to purchase a contract from that center. Buyers more than 75 miles away must purchase service from a third party firm approved by Tandy.

Such requirements can be expensive, since some vendors charge more for service than competing third-party companies. Before you decide to lease, get a firm commitment on the cost of service. Shop around for other deals. You can sometimes save as much as 50 percent by using a different firm. This may require you to buy the equipment rather than lease it, or to lease it from a different company. Don't forget that there are many independent leasing companies around the country. Most allow you to select your own service company.

Can the manufacturer provide a good service organization? If you are not bound to a certain service company, your next question should be "who does the manufacturer recommend?" Give this service organization the same careful scrutiny as any other.

Vendor-sponsored maintenance is widely thought by users to be the least expensive. Yet this is often not the case. Vendor service is often more expensive than TPM service. And while you might expect the vendor's personnel to be best at servicing its products, the rapid expansion of many computer companies has left them with woefully inadequate service staffs.

Can the distributor or dealer suggest a good service organization? If the vendor cannot provide service that meets your standards, check with the dealer or distributor. For instance, TRW, the nation's largest third-party service firm, has service arrangements in place with a number of distributors. Such arrangements provide some assurance that the service company will be familiar with your equipment and will have timely access to parts.

Can I locate a good third-party maintenance organization on my own? If the above methods fail, you may have to shop around on your own for a TPM.

In many cases, you should inquire about local TPM's anyway. Third-party firms like to claim that they have advantages over vendor-supplied service. Vendors often see repair work as a bothersome sideline, while TPM's specialize only in service. They have to do a better job, goes the argument, to stay in business. The big ones have a large pool of talent, including specialized troubleshooters if the problem can't be handled by the first technician on the scene.

Moreover, TPM prices are often 7 to 30 percent less than vendor's. Beware of false economies, however—sometimes the lower price means a lower level of service. And third-party maintenance may not be a good idea during the warranty period, since you risk the loss of warranty protection by using an outside firm.

TPM's may be the best way out for companies with many locations and those using several brands of equipment at the same site. You can often save time, headaches and money by contracting with one large service firm to handle all maintenance, regardless of location or the make of the equipment. Otherwise you can find yourself in the midst of endless finger-pointing contests and scheduling conflicts between the service organizations from the various vendors.

How To Cut Your Service Costs

On-site service for small computers typically runs from 12 to 18 percent of the hardware cost per year. "Depot" or "drop-off" service runs 9 to 12 percent of the hardware cost.

You may be able to reduce the cost of service in a number of ways. Find out, for example, if you can purchase a contract with a deductible clause like the ones in automobile insurance policies. And you may be able to reduce cost by choosing a lower level of service. The company you choose should provide you with several different choices. Starting with the most expensive, these typically include:

- Four-hour on-site response
- Next-day on-site response

- Courier service (service company picks up unit and redelivers when repaired)
- Carry-in or “depot” service
- Remote diagnostics with customers doing their own board-swapping
- Mail-in

Examine your alternatives carefully, and don't buy more service than you need. You may be able to get by with on-site service for the essential components and a lower level of service for the rest. Although it may mean that you have to educate your operators, you should be prepared to assume some portion of the service burden yourself if you want the best price.

Many office workers are accustomed to phoning for a service rep if their copier or typewriter malfunctions. When the computer arrives, they may have to learn how to unplug a printer or a disk drive and take it to the repair center. Since service contracts for printers and other peripherals are generally more expensive than for any other part of the system, you may want to take a hard look at reducing the level of service you purchase for these components.

Some users also try to save with the “do-it-yourself” approach. In general, do-it-yourself maintenance is recommended only if loss of your computer would not be critical. Nevertheless, some microcomputer manufacturers will teach buyers how to “board swap.” Using vendor-supplied diagnostic programs, you determine the general site of the problem. Then you remove that board, and simply replace it with an identical unit. The defective board is sent on to the factory for repair, and you can go on running without pause.

Such self-maintenance can save a lot of money. Some users with multiple microcomputers practice a form of this swapping on their own. They keep one or more “spare” computers on hand. Although the spare may be in use, it is not in a crucial application. If one of the other computers goes down, the spare can be used until the defective unit is back from the repair center. Protecting yourself

with redundant equipment generally becomes practical once you have more than three small computers of the same brand. For extremely time sensitive applications, however, some companies buy a second computer soon after they install their first one.

Should I Hire My Own In-House Service Technician?

Can you save money by hiring an in-house technician? Probably not. Hiring a technician is generally cost-effective only if you have to keep a mainframe computer running in a remote location where vendor service is not available. You would pay at least \$20,000 per year to get a technician—if you could find one and if you could keep him from accepting a better offer as soon as he was trained.

And recruitment and salary expenses are not the end of the story with in-house maintenance personnel. Unless you keep sophisticated testing gear and a stockpile of parts on hand, you won't gain any advantage by having a technician on location. Each time the computer breaks down, you'll have to wait while needed parts are rounded up. A complete inventory of parts and testing equipment can run as high as four times the cost of the computer itself.

Hiring in-house service personnel is an expensive proposition. Moreover, if your people don't have the proper skills they could end up voiding the vendor's warranty. Generally it's better to let the vendor or a service company train and equip technicians, and hire their services only as required.

In the introduction to this chapter, we promised you that learning the basics would help you to have your cake and eat it, too. True enough—*unless* someone steals a piece. In the next chapter you will learn about the menace of computer crime . . . and what to do about it.



CONSUMER ALERT

Service And Maintenance Contracts

Finding a reliable service has proved to be a real trouble spot for most small computer users. Nevertheless, you *can* protect yourself for a reasonable fee if you shop carefully. Here are some suggestions on how to go about it. These tips apply whether you use the vendor's service organization or whether you contract with a third-party maintenance company (TPM).

Before You Sign The Contract

You shouldn't need a service contract for the first months on your new system. You should get a warranty of at least 3 to 6 months when buying new equipment. This warranty should cover any and all repairs except those caused by operator abuse.

Caution: Some manufacturers date their warranty from the day the machine leaves their factory. If the unit has been sitting on a warehouse shelf for a few months, the warranty may have already expired. Get your warranty spelled out and *dated*.

When it comes time to sign up for service, carefully screen all prospective service organizations, *including the vendor's service department*. While it's true that the vendor is the one who stands to gain from your satisfaction (namely repeat business), small vendors often skimp on service. Find out the credentials of the person who will work on your equipment. The "trained service technician" may be a part-time college student who cut his or her teeth fixing TV sets. Anything more difficult than a blown fuse may be too complex.

It's equally important to check out third-party firms. Talk to other customers in your area before signing any agreements. If the company can't provide local references who use your brand of equipment, this is probably a warning signal that the level of service will be inadequate.

Large computer manufacturers don't always have good service records, so check them out, too. Certain computer companies have grown so fast they have outstripped their capacity to provide support. Radio Shack, Apple, Xerox and Wang are examples of big-name companies that have sometimes gotten bad marks from service customers in certain parts of the country.

And watch for the "fake" service department. Ask some local dealers if they handle service and they'll reply: "Just bring it in and we'll take care of it." All they do with

broken equipment, however, is to box it up and send it to the factory service center. That may be adequate for non-critical parts of your system, but if your CPU breaks down, you are going to need more than someone who will merely mail it to Topeka for you.

A word or warning about factory service. A few of the smaller computer makers have been swamped by unexpectedly high sales. Service backlogs can run into weeks or even months. Even worse, some systems get a double run-around. First, it sits in line at the factory where they were assembled. Then, if problems are discovered with the disks drives or the Winchester hard disk, these components are sent to their original manufacturer, where they wait in line again. This type of problem is one more reason to shop for local service.

But make sure that the service is local, not just the salesperson. Ask the service company where their technicians will be coming from. If the nearest branch is a six-hour drive away, you are obviously not going to get four-hour response time, no matter what the contract reads.

And don't forget to ask about the number of computer installations in your area and the number of technicians available to service those installations. A company that's in over its head won't be able to keep its promises.

Slow response to trouble calls or the appearance of an inexperienced technician can result in extended downtime. Don't consider a service organization unless it has:

- Several technicians. A single-person service department is too fragile; you could be left without local service if the repairman departs.
- A complete stockpile of parts. Many small dealerships cut costs by stocking a minimal parts inventory. Users can end up waiting weeks for crucial parts to arrive from a far-away depot.
- Factory-trained technicians. You don't care how many junior colleges, trade schools or mail-order courses the technicians have completed. You are looking for people who are experts in *your* particular system.
- A nearby branch.
- Local references.

What To Cover In The Contract

A comprehensive on-site contract covering all components of a system can cost well over a \$1,000 a year. Although such coverage may be justified in time critical situations, it may be maintenance overkill for less urgent applications. In such cases, it's usually sufficient to buy on-site coverage for the most essential portions of the system: the CPU, the CRT and the hard disk drive.

The other portions of the system—the external floppy disk drives, printers, and other

peripherals—can often be handled on a money-saving “carry-in” basis if there is a repair center in your area. If not, you can contract for on-site repair on a time and materials basis. Although the response time won’t be as fast, you can usually get by for a day or so without these components.

Negotiating The Contract

The best time to negotiate a service contract is *before* you buy the system. You can often get concessions and promises from a dealer who wants your business. Before the sale, you might convince the dealer to promise spare parts or even a loaner machine from his inventory if your system cannot be repaired within a few days. After the sale, on the other hand, you have very little leverage, especially if you are contracting with a TPM.

When negotiating a contract, remember that you get what you pay for. If the dealer gives away the service to make the sale, he or she is going to remember that if you call repeatedly for service. On the other hand, don’t be afraid to drive a hard bargain and to look for the best possible deal in your area.

Like standard purchase contracts, service contracts are generally one-sided in favor of the vendor. Response time is often not mentioned; the fine-print exceptions take up pages; and there are few, if any, hard promises. **Tip:** Give the contract to your attorney for his or her review *before* you sign. And don’t believe anything the sales rep says unless it’s down in black and white.

You are unlikely to get everything you want, but you’ll be wise to ask for everything and then yield on those points that aren’t as crucial. Things to look for in a service contract include:

- **Guaranteed response time.** If the computer is used 24 hours a day, repair service should be on the same basis. In most cases, protection during normal working hours will suffice. The service company should guarantee to be at your site within a certain number of hours after your call. Twenty-four hours should be the outside figure you consider. Many service companies will guarantee a representative at your site within four hours.

Make sure to define the type of response as well as the time. You want a qualified technician at your site within the promised time, not just anyone from the organization.

- **Guaranteed repair time.** Microcomputer buyers can’t expect this level of service, but minicomputer users should stipulate that the system will be corrected within a certain period of time.
- **Periodic “checkups”** as preventive maintenance.
- **A “loaner” policy** providing a temporary replacement for a CPU or CRT that will take a while to fix.
- **A replacement policy** for “lemons”—unfixable machines that continually go on the

blink. Try to pin down a certain downtime percentage that will qualify the unit for replacement, (e.g., if the system fails four times within 30 days the vendor will replace it.)

- A penalty clause that spells out just what you get if the company fails to keep its promises. A four-hour response guarantee doesn't mean a thing unless the service firm will be penalized for failure.
- Adequate notification of price increases. Rate increases are sometimes as high as 25 percent. You should have at least 90 days notice of price hikes so you can shop around for a different service company if you want.

Most of the third-party companies listed below will send rate schedules and sample contracts upon request.

Computer Hardware Service Company
11 Vincent Circle, Jacksonville Park
Ivyland, PA 18974
(215) 443-9220

Computer Logistics
718 Morse Dr.
Schaumburg, IL 60193
(312) 980-4132

Computer Maintenance and Leasing Corporation
1009 Twelve Oaks Center
Wayzata, MN 55391
(612) 473-3608

Computer Maintenance Technologies
6901 West 117th Ave., No. 4
Broomfield, CO 80020
(303) 466-5921

Control Data Engineering Services
5720 Smetana Dr.
Minnetonka, MN 55343
(612) 931-3026

Dataserv Equipment
509 Second Ave. S.
Hopkins, MN 55343
(612) 933-2575

Dow Jones Communications
P.O. Box 300
Princeton, NJ 08450
(609) 452-2000

G.E. Equipment Service Dept.
1 River Rd.
Schenectady, NY 12345
(518) 385-0551

Indeserv
294 Great Road
Littleton, MA 01460
(617) 486-3561

Preferred Computer Service
5809 Hammersley Road
Madison, WI 53711
(608) 273-0319

RCA Service Co.
Route 38, Building 204-2
Cherry Hill, NJ 08358
(609) 338-4400

Sorbus
50 E. Swedesford Road
Frasier, PA 19355
(215) 296-6000

Servitech
1409 Centre Circle Drive
Downers Grove, IL 60515
(312) 620-8750

TRW
70 New Dutch Lane
Fairfield, NJ 07006
(201) 575-7110

WORKSHEET #6**MAINTENANCE AND BACKUP**

Be sure to assign responsibility for these important tasks to staff members. Mark your own calendar for followup.

RESPONSIBILITY OF**EVERY DAY**

- Make backups of all data files used that day.

EVERY WEEK

- Make backup copies of all programs and data files for off-site storage.
- Clean the computer room.

EVERY MONTH

- Take preventive maintenance steps for all equipment. (See chapter for suggestions.)
- Run diagnostic programs.
- Check supply room, order needed replacements.
- Print out paper backups of ledger accounts and other important reports for storage off-site.

EVERY TWO MONTHS

- Schedule preventive maintenance visit from service company.

EVERY 12 MONTHS

- Print out paper backups of all year-end reports and all important files (customer lists, inventory lists) for storage off-site.
- Backup financial and tax records for archival storage.
- Give staff a refresher course on operating basics.
- Perform security and disaster audits (See following chapters.)

WORKSHEET #7 (a)

PROBLEM LOG

Fill in applicable blanks for all problems and maintenance work. Attach supporting materials such as printouts, results of diagnostic programs, written instructions from service representative, etc.

Date: _____

Name of person reporting: _____

Name of program being run
when problem occurred: _____

Time program was started: _____

Time problem occurred: _____

Last action taken by operator: _____

Description of the problem: _____

Diagnostic programs run? _____

Results: _____

Date and time service rep notified: _____

(Continued)

WORKSHEET #7 (b)

PROBLEM LOG

Date and time service rep arrived: _____

Action taken: _____

Parts replaced: _____

Recommendations: _____

Chapter Four

How To Protect Yourself From Computer Crime

Crime-Proofing Your Small Computer



- A small, east-coast manufacturer discovered that a data entry clerk, in collusion with a freelance programmer, was altering accounts payable and receivable to divert money to herself and her partner.
- A Louisiana contractor was stunned when his long-time bookkeeper turned out to be juggling payroll data to get checks for phantom workers, which he then cashed himself.
- A chiropractor found that an employee was using the computer to quickly and easily generate fraudulent insurance claims, to which she forged his signature.
- A Minnesota distributor installed an order entry system. Because of a bug, it erred by a few cents per transaction. The employee charged with checking the computer totals against the old manual system didn't do his job; he felt it was too much trouble. It was a year and \$20,000 later before the error was isolated.

- A California publisher was shocked to find that his mailing list—one of his most valuable assets—was being sold to competitors by one of the clerks that entered names into the computer.

Computer crimes like the ones described above can cost a small computer owner thousands of dollars.

Without the proper safeguards, a computer can threaten the survival of a small business by making embezzlement easier to accomplish and harder to detect. With manual systems, only a few trusted employees have access to the books and an opportunity to defraud. But automation makes all the records available in one place—the computer terminal.

That computer terminal can put a low-paid employee in a position to steal enough money to bankrupt a business. A clerk hired to make routine entries could conceivably steal the place blind. Because of the speed of computers, a small change can quickly become the basis for a significant loss, yet the operator can simply tell the computer to erase any record of the illicit activity. The theft may not be discovered for months or even years.

To make matters worse, the smaller the system the more vulnerable it is to fraud, vandalism and unintentional foul-ups. Unlike their larger mainframe cousins, small computers don't have nearly as many built-in safeguards. Small computer buyers rarely understand that they need an entirely new set of control techniques when they start using their new equipment. They express attitudes such as "Let's get the system working and worry about security later" or "It can't happen to us." These points of view, unhappily, lead to an undisciplined computer environment that is ripe for trouble.

The solution to these problems lies in low-cost security measures like the ones suggested in this chapter. These techniques depend largely on prevention. They can be established without great expense and, in most cases, without technical assistance. While the methods we suggest are not costly, they do demand that you

plan ahead and that you exercise authority and diplomacy with your staff. Not every small computer owner should undertake every measure described below. The steps taken—and the money spent on them—must be weighed against the risk of loss. Still, it will pay you to review the entire chapter, if only to gain an awareness of the weak links in the chain so you can be more vigilant in those areas. It *can* happen to you.

Below are details about typical security problems plus an explanation of preventive measures you can take. At the end of the chapter is a security audit worksheet to help you pinpoint your weak spots.



There's nothing new about the methods for computer fraud, but they are far easier to hide than old-fashioned book-juggling.



Is it really necessary for a small computer owner to worry about security? According to experts, any business which relies on computers to pay bills, issue payroll checks, inventory merchandise or perform any other accounting function is vulnerable to computer theft.

For the most part, computer cheats use age-old embezzlement methods, but they do them faster and better with the help of electronics. There's nothing new about the methods for computer frauds, but they are far easier to hide than old-

fashioned book-juggling. Changes in handwritten books would arouse suspicion, but entries in a computer's magnetic memory can often be altered without detection.

Most small computer systems are exposed to losses from fraud and theft, from vandalism (random destruction) and from employee negligence. The most frequent type of security loss involves the manipulation of transactions. In a recent survey of fraud cases, 40 percent involved fraudulent payment. Moreover, collusion was found in a surprising number of incidents.

Common sense will tell you which parts of your business are vulnerable to loss. Common sense may not be enough, however, to tell you what to do about it. All small computer systems should have a program in place with these goals:

- To protect company assets
- To protect the privacy of sensitive data
- To keep employees from unnecessary temptation
- To deter employees who have the opportunity to defraud
- To prevent the accidental distortion of data, and to discover such errors if they occur

A Low-Cost Security Program

Be prepared to learn a bit about your computer system and its built-in protection. It's vital that you know enough to spot if someone has been tampering. The most common safeguards are internal systems such as passwords—specific codes which the operator must enter before proceeding. The idea is to restrict access to authorized individuals who know the code. A data entry clerk might have a password which allows entry to payroll data (hours worked, etc.) but not to find out about salary rates or to print out checks.

Another internal safeguard is to program the computer to flag any operation that

does not conform. For example, the system might list on an exception report any payroll check written above a certain amount. Exception reports can also show where data has been changed, revealing illicit manipulations.

Unhappily, much of the software on the market does not include adequate security features. In some cases, you can buy inexpensive products to upgrade your protection. Many of these rely on *encryption*, the scrambling of data. You can buy software programs and plug-in devices that add encryption features to small computers. Even where safeguards exist, management may be unaware of them or believe that they are not worth the trouble. Moreover, far too many businesses rely exclusively on password protection. Passwords are not a major barrier to an experienced programmer. You can't rely solely on password and similar schemes to protect your company from fraud or error. Regardless of the sophistication of the controls you use, somewhere down the line you must put your trust in people, and people represent the weakest link in small computer security programs.

Well-designed security policies can strengthen that weak link. A major step to curtailing computer abuse is to set forth your standards in no uncertain terms. If the owner sets high standards and applies them consistently, employees have fewer chances to justify dishonesty.

Make it clear to all employees that they have a stake in computer security. Instill a security-conscious attitude. Involve your staff in planning and periodically reviewing the security plan. A recent research study revealed that the average computer thief is a white-collar worker who is not a repeat offender. Such "amateur" criminals can be swayed by policy statements that describe acceptable employee behavior and by peer pressure.

Establish disciplinary measures in advance, and stick to them when violations are discovered. Certain security measures may be unpopular because they mean some

slight inconvenience to staff. Nonetheless, you must insist on strict compliance. Your policies will have no deterrent effect unless employees believe they will be punished if caught.



IDEAS YOU CAN USE

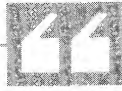
Small Computer Security

- Where possible, segregate duties. Small companies often concentrate all computer responsibilities in the hands of a single individual, increasing the risk of abuse and lessening the chances of discovery. Job segregation and physical separation of computer employees will minimize the number of people who know enough to commit fraud.
- Setting up a security program is a good time to call in your accountant or auditor. For a one-time fee ranging from \$1,000-2,000 they can set up a control system to guard against intentional and accidental loss. It's often cheaper to have outside auditors involved right from the beginning of your computer purchase so they can build appropriate safeguards from the start. An experienced systems auditor, particularly one trained to work on smaller systems, can check the controls before the system is installed, avoiding costly changes later on. Businesses that can afford it should hire accounting firms to audit their system three or four times a year at an annual cost of about \$10,000.
- Regardless of your other precautions, consider bonding all computer personnel to limit the economic loss of a computer crime.
- Seriously consider the purchase of an inexpensive paper shredder. Many computer crimes have been based on information gained from waste paper baskets.
- Rotate computer employees' jobs and responsibilities. The rotation of duties allows more than one person to learn each task, providing backup in case of illness or termination. Moreover, employees can review each other's work for errors or manipulation. Although a small business may be limited in the number of people it can hire to operate the computer, it should rotate duties to the greatest extent possible. Some users believe that job rotation is a more effective deterrent if it is not announced until the last minute. Employees in positions of trust will not know when they may have to leave their present position and be unable to "cover their tracks."

- Investigate any unexpected changes in sales, net profits or expenses. Computer fraud might be the cause.
- When a computer employee is terminated, hand over the severance pay along with the pink slip. Escort the employee as personal belongings are picked up and then to the door. Do not permit any further access to equipment or data. Immediately change all passwords, even those the employee was not supposed to know. A large percentage of computer foul-ups are caused by disgruntled employees.
- Manually sign all computer-generated checks while reviewing the check register and underlying support documents.
- Insist that all computer personnel take a vacation each year. By requiring a vacation of at least two weeks, management can often detect embezzlements that require continuing efforts to keep hidden.
- A trip to the company parking lot can be revealing. According to recent studies, computer criminals who remain on the job are known to drive flashy cars too expensive for people at their salary level. Be alert to other inexplicable or sudden improvements in the life style of a computer employee.
- Computer criminals may be found outside your company as well as inside. Most software vendors and programmers are honest, but there are some bad apples. Choose programmers and consultants as carefully as you select attorneys or accountants.
- You may be able to insure yourself against certain security risks. See Chapter Five for information about computer insurance.

The Best Defense Is A Good Offense

A well-defined security program will put you on the offensive against computer crime by stopping it before it gets started. Your program will require cooperation from employees and from management alike.



Put your computer security policies in writing so employees know exactly what is expected.



What Employees Must Do

First of all, we suggest that you put your computer security policies in writing so employees know exactly what is expected. Here are some of the issues you should address:

Access To The Computer. The most basic form of security is control over who has access to the machine. For small businesses, physical security is one of the simplest and most effective deterrents to electronic crime. Make it clear that unauthorized people may *not* fool with the equipment. Back up this policy with physical constraints. Physical security should be aimed at preventing breaking-and-entering type burglary and at keeping unauthorized people away from the equipment.

If at all possible, the computer should be in a separate room where it can be locked away when not in use. Ideally, it should have its own separate burglar alarm. Do not make keys to the various doors and cabinets available to everyone, even if it means some slight inconvenience. If the computer area is connected openly with the rest of the business section, try to find a setup so only those who

need to can get to the terminal. You may even have to block off the surrounding area.

You must control access to the computer area. Keep all unauthorized people out of the computer room, including vendors unless they must enter to make repairs. Someone with programming knowledge may only need a few minutes to steal the codes or make the program changes necessary to put a plan into effect. Perhaps the best-known example of this is Stanley Mark Rifkin, a freelance computer consultant who stole \$10.2 million from Security National Bank in 1978. To get the codes he needed, Rifkin had to go to a part of the bank in which he did not belong.

And don't forget that some computers can be tampered with over the phone. If a small computer is equipped with an auto-answer modem (a device letting it "talk" over the phone) employees or outsiders can arrange to call in after hours (if the equipment is left running). Using an inexpensive terminal or a personal computer, they could "get inside" the computer from a remote location.

The easiest way to prevent phone tampering is simply to stay away from telephone hook-ups and other remote links unless sophisticated safeguards are in place. Rifkin, for instance, stole his money by talking to a New York computer over the phone.

But remote computing linkups and telecommunications are often valuable to small computer owners. If you decide you wish to use a phone hook-up, give some thought to making it secure. A key-lock, for instance, might give some assurance that the machine could not be turned on after hours. Another safeguard is to keep the computer hooked up to an unlisted number that is periodically changed.

Some systems will keep a record of all attempts to log-on to the computer. Such reports often show which passwords were attempted and how long the individual spent trying to get on. If your computer produces such reports, review them periodically. If you see signs of someone trying to "break in," change phone numbers and passwords immediately.

Access To Sensitive Programs and Data. Although it may seem like stating the obvious, we want to emphasize that you should restrict access to such things as payroll programs, preprinted check forms, passwords, and technical documentation that could be used to defeat the computer's built-in security provisions. This step can be as simple as locking such material in a cabinet, or keeping it at home except when actually needed.

Reporting Security Violations. A policy statement should require all employees to report known and suspected security violations. A policy that turns everyone into a potential informant should make a criminal more concerned about being caught. To encourage compliance, make it clear that all reports will be held in confidence, but failure to report violations may bring disciplinary action.

Personal Use Of The Computer. Your policy should state that personal use of computing resources is not permitted without prior management approval. You may want to grant such approval for such things as personal word processing, mailing lists for professional societies, homework for evening classes in computers, computer games and so on. If you decide to allow personal use of the computer, be aware that it provides the perfect excuse for a potential criminal to experiment with the system right under management's nose.

Background Checks. One of the most important facets of computer security is the selection of personnel, since operators have access to sensitive information and perhaps to company assets. It's wise to require a mandatory background check for all computer personnel, even if they have previously been with the company in some other capacity. If an individual has been untrustworthy in the past, that person may be so again in the future. A dishonest person may not even apply for a position if background checks are required. Don't make the mistake of requiring background checks only for managers and supervisors. In a recent survey of fraud cases, the jobs of the offenders in order of frequency were (1) data entry, (2) manager, (3) programmer, (4) operator and (5) other staff.

Personnel in extremely sensitive positions should have a background review

annually. Such checks can turn up changes in life-style, attitudes and work habits that may indicate fraudulent activities.

Non-disclosure Agreements. Employees who come into contact with sensitive information should be required to sign a non-disclosure agreement. In such a document, the employee acknowledges that the information is confidential. He or she promises to use it only for the intended purpose and reveal it only to authorized people. Most such agreements indicate that violation will subject the employee to penalties under law.

What Managers Must Do

Management also has a crucial role in maintaining computer security. There are many simple and sensible ways to lower the risk of computer rip-off. Here are some of the steps you can take to reduce the likelihood of computer theft or negligence:

Manual Input Controls. Manual input controls must be compared to computer-generated output. A common example is the batch total. Before documents are entered into the computer, they may be counted or certain numbers added from each transaction (e.g. dollar amount, invoice number, etc.). This total is compared to the computer's total after processing. Such controls can spot accidental mistakes as well as intentional fraud.

For instance, you or a trusted employee should total items before they go to an operator for entry into the computer. If \$10,000 of invoices are scheduled to be entered, check the total in the computer to be sure accounts receivable increased by that sum.

Another type of manual control is a log listing the activity of the system. It can keep a listing of jobs processed, programs and files used and by whom, transactions entered and errors incurred. Review of the log by an alert manager can reveal errors or the unauthorized use of programs. If both manual and

computer-generated logs are available, each can verify the accuracy of the other.

Manual input controls are only effective if they are rigidly enforced. Otherwise, employees will soon balk at the extra trouble to keep these records.

Computer Input Controls. Some computer systems can be programmed to maintain a console log, a list of all communications between the operator and the computer. Periodic review of this log can reveal if an operator has tried to override passwords or other unusual occurrences. If your system doesn't have such a log now, ask your vendor if it can be made available, and arrange to review it regularly.

Spot Checking. From time to time, make independent checks on data used by the computer. For example, take a look at the list of accounts payable. Are there any unfamiliar names? Are all the names on the list legitimate businesses? Could they be dummy operations for fraudulent purposes? Did you actually receive the merchandise? When was it delivered? Who used it?

Management should make informal spot checks on a continuing basis. Ask for occasional printouts of master files or transaction files on the spot. Review them personally. A few hours spent browsing through payroll or accounts receivable records can turn up past misdeeds and discourage future attempts. As a deterrent, be sure that employees understand that their work is subject to unannounced checking at any time.

Program Review. Although you should not rely solely on the built-in protection schemes of your software, they are your first line of defense. Test them periodically. Remember that a clever employee can steal passwords or alter programs. Make sure that the controls are still working. Does the program still deny access to anyone without a password? Do exceptions still show up on the audit trail or console log?

You can make it harder to tamper with your program by limiting access to the

“source code.” Source code is a listing of the program in a high level language (such as BASIC or COBOL) which can easily be read and changed by a skilled programmer. To run on a computer, programs must be converted to “object code,” the machine language which is much harder for a programmer to make sense of.

You may save yourself a lot of aggravation by keeping the source code safely locked away.

Change Passwords. Guard passwords to sensitive programs with extreme care. Don't write them down where they are easy to find and don't give them out unnecessarily, even if it means that you must be the one to handle certain computer procedures. Even if you trust your employees, they could inadvertently give the password to a dishonest person. Never use obvious devices like your initials. Change passwords every three months and whenever an employee is terminated. And don't use the same password for each program. Use separate passwords for different programs.

An Annual Security Audit. Your security program must be periodically reviewed, evaluated and updated. Methods and programs will change over the years and so must the controls. Areas which lack control should receive immediate attention.

An audit reveals if your program is functioning and also impresses upon your staff the importance of security. Over time, employees gradually become less alert and less committed to security, since losses occur infrequently and security measures often require additional effort. Periodic audits accompanied by briefings will help motivate the staff to comply. No program can work if employees fail to follow procedures or find easy ways around them.

The audit can be performed at any time during the year. It should contain both scheduled tests and random, unannounced tests. Surprise audits help guard against alteration of the system by a clever employee. You may wish to engage an outside firm to perform most of the checking, but company management should also get

involved.

The accompanying worksheet will get you started on your own security audit. It contains general questions about security policies. If you supplement this worksheet with specific questions about your company's programs, assets and problem areas, it can be a big step towards a safer computer system.

In summary, we suggest that you install a low-cost security program with periodic security audits. The alternative is to leave the door open to losses. Take the time to integrate these two steps into your operations. They could save your company a bundle—or, quite literally, save your company.

How can you save your company if fire or other disaster strikes the computer? That's the subject of our next chapter.

WORKSHEET #8 (a)**SECURITY AUDIT**

Photocopy this worksheet and use it to review your company's operations. A "Yes" answer to any item means you already have such a security measure in place; a "No" means you do not. After completing the entire worksheet, consider each "No" in detail to see if it indicates a weak spot in your security safeguards.

| | YES | NO |
|--|--------------------------|--------------------------|
| EQUIPMENT AND SITE | | |
| Is the computer in a separate location where it can be locked up at night? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are doors, windows, locks and alarms sufficient to prevent burglary and unauthorized access to the computer? | <input type="checkbox"/> | <input type="checkbox"/> |
| Is access to the computer denied to all but those who have a business need to enter? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are operators trained to challenge unauthorized visitors? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are sensitive documents and programs safely locked away? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do employees understand that personal use of the machine is forbidden without prior management approval? | <input type="checkbox"/> | <input type="checkbox"/> |
| PERSONNEL | | |
| Have you identified the employees who are in a position to inflict harm via computer crime? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you perform background checks on all computer personnel? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you periodically recheck the background of employees in sensitive positions? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you require non-disclosure agreements from employees with access to sensitive data? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are employees required to take scheduled vacations? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are employees prohibited from initiating original accounting transactions and adjustments? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do employees understand and believe that you will prosecute someone who commits fraud, theft or vandalism? | <input type="checkbox"/> | <input type="checkbox"/> |

(Continued)

WORKSHEET #8 (b)**SECURITY AUDIT**

| | YES | NO |
|--|--------------------------|--------------------------|
| Do employees understand that they are required to report suspected security violations or be considered an accomplice? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the jobs rotated periodically? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you deny terminated employees any further access to the equipment to avoid security breaches or vandalism? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you periodically review security precautions with the entire staff to remind them of their obligations? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you conduct exit interviews with employees to learn if they were dissatisfied and to discover possible problems with remaining employees? | <input type="checkbox"/> | <input type="checkbox"/> |

SOFTWARE

| | | |
|---|--------------------------|--------------------------|
| Do all sensitive programs generate exception reports to warn of such things as checks in unusually high amounts, large inventory usages, repeated attempts to use a false password and other suspicious activities? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do all accounting programs have an easy-to-trace audit trail? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you periodically review all important programs to make sure all security controls are still in place and working properly? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do changes to programs require top management approval and at least two signatures? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do customer lists contain decoy names and addresses for detecting unauthorized use of those lists? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have a console log or other machine-generated listing that records user commands and access to sensitive files? Do you review it for signs of tampering? Do you keep the source code safely locked away to prevent unauthorized program modifications? | <input type="checkbox"/> | <input type="checkbox"/> |

PROCEDURES

| | | |
|--|--------------------------|--------------------------|
| Are passwords regularly changed even if there have been no obvious problems? | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|

(Continued)

WORKSHEET #8 (c)**SECURITY AUDIT**

| | YES | NO |
|--|--------------------------|--------------------------|
| Are all passwords changed whenever an employee is terminated? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are computer documents checked against manual input control (batch totals, etc.)? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are sensitive documents shredded, burned or otherwise disposed of where they cannot be used against you? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you keep the computer's phone number a secret and change it periodically? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you make periodic, unannounced spot checks? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you hold an annual security audit? | <input type="checkbox"/> | <input type="checkbox"/> |



Chapter Five

Disaster Planning Made Easy

*How To Cope With
Computer Catastrophes*

If your computer was wiped out tomorrow, could your business survive? For some companies the answer may be **NO**. Yet if those same companies were to take the simple steps outlined in this chapter, they could dramatically improve their chances for survival. And disaster planning doesn't have to be difficult or expensive. It really boils down to two simple steps: (1) prevent all the emergencies you can and (2) prepare yourself to cope with those you can't. In this chapter, you'll find advice and worksheets to make these tasks easy.

Fire, flood, earthquake, even smoke and moisture can damage the sturdiest computer. Static electricity or a surge or loss of power can scramble its data. The repair of crucial components can take weeks or months. The case history on the following page details a minor disaster. We also know of some major incidents. In a few cases, computer disasters have shut down businesses for months.

Who Needs It?

Even if a computer catastrophe didn't close you down, it would probably make business-as-usual virtually impossible. Ironically, the very people who have the most to lose are often those with the most inadequate disaster plans. The smaller the business, the fewer the resources for recovering from a disaster. Despite the dangers, there is a widespread lack of concern about emergency planning. Few small businesses are prepared for problems. While large companies have detailed recovery programs, smaller companies usually have none.



CASE HISTORY

WHAT CAN I LEARN?

At ACU, we hear plenty of horror stories about computer disasters. Some involve fires or floods that destroyed equipment and brought companies to their financial knees. Others, like the one below, are not quite as dramatic. Nonetheless, they illustrate an important point: Not all disasters result from cataclysmic events. Sometimes a small problem can mushroom into a big loss *unless* you are prepared with a disaster plan.

The small computer user in this story is a national membership organization. It used a microcomputer with a hard disk drive to process its membership applications, renewals, accounts receivable and so on.

Everything was fine until a few days before the purchase warranty was due to expire. That was when the first problems began to show up. Unfortunately, it was the Christmas holidays and phone calls to the manufacturer brought only the news that everyone was on vacation.

The organization decided to wait things out, believing the manufacturer would honor the warranty even though it would have technically expired by the time the holidays were over. To the vendor's credit, the personnel were sympathetic and willing to take

responsibility. They promised to send their local dealer to check things out . . . tomorrow.

He finally showed up four days later. He had been too busy to respond sooner. After looking at the system, he determined that the hard disk drive should be replaced. Unhappily, he had no such drives in stock, but a call to the manufacturer elicited a promise to send the needed unit by express service . . . tomorrow.

It finally showed up a week later. But that didn't solve things—the local repairperson now decided that it was the operating system that was causing the difficulties. The system needed a new, updated version. He didn't have one, but he could arrange to get another copy . . . tomorrow.

But the new operating system didn't solve the problem either. At this point, the local repairman decided the difficulty was centered in a board. He replaced it, but the system still wouldn't work right. Then he decided that the new disk drive was also faulty, and another new drive was ordered.

With all the changes and replacements, the organization lost all the data on its main disk drive. Suddenly, it became very concerned with its backup procedures. Had everything been saved? To make matters worse, the secretary most familiar with the system resigned in the middle of the whole mess. By the time the secretary's replacement was hired, it had become necessary to reconstruct an entire month's work by manual means. Meanwhile, the form letters that had been routinely generated by the computer had to be typed by hand. That meant hiring temporary typists.

By early February, five weeks after the system originally went down, the organization was beginning to believe it might not ever see its computer system operational again. In desperation, it purchased a second system almost identical to the first. The replacement system showed up several days later. The original system was finally repaired eight weeks after the problem had originally developed.

One reason this organization did not take steps to get a new system sooner was that the vendor was always promising "tomorrow." Just one more day, he would say. It took five weeks of "tomorrows" before these users realized that they had to take drastic steps to get back on the track again.

You've probably already spotted the moral to this real-life case history. If your system goes down, your vendor will probably do everything possible to get it running again by tomorrow. Yet despite the vendor's best intentions and efforts, tomorrow could come too late to prevent financial catastrophe. Is there a solution? Yes—**careful disaster planning.**

Do all small computer users need disaster planning? No, not all of them. Some businesses can do without their computer for a month or more. Others use it more as a convenience than as an integral part of their operation. Most users, however, are very vulnerable. The longer you own a computer, the more you come to depend on it. Because small computers are so inexpensive, their true value is often underestimated. A small system may carry an application that means thousands of dollars to a firm, yet be treated with the same care as an electronic typewriter because it costs about the same.

Yet disaster planning doesn't have to be difficult, time-consuming or expensive. Unlike giant corporations, your plan won't be complex, nor will it address every possible threat to the computer. Instead, you will take a common-sense approach. You will identify the functions critical to your organization, and concentrate your efforts there.

In this chapter, you will find a simplified approach to disaster planning that comes in two stages. First, you take steps to correct any potential problems. Let's call that **disaster prevention**. Then you should plan recovery procedures to bring the system back as soon as possible if disaster does strike. Let's call that second step **disaster recovery**.

Disaster Prevention

The most overlooked part of computer disasters is preventing them. The best solution to computer emergencies is to avoid them in the first place. Although that isn't entirely possible, small computer users can go a long way toward reducing their risks, and without spending a lot of money or time.

The previous chapter on security mentioned ways to prevent disasters from fraud and theft. Our case history discussed disasters from mechanical breakdown and loss of data. Here are three additional measures you can take to avoid certain other kinds of emergencies.



The best solution to computer emergencies is to avoid them in the first place.



1. Fire Protection

After mechanical breakdown, the most common cause of computer disaster is fire. A good percentage of fire damage can be prevented by common sense procedures like these:

Extinguishers. Fire extinguishers are an essential component in any company's disaster prevention program. Not just any fire extinguishers will do, however. Sprinkler systems, for example, are terrific fire protection for your building, but terrible protection for your computer. The water from sprinklers can do as much damage to computer hardware as fire and smoke. If your building has an existing sprinkler system, consider doing away with the sprinkler head in the computer room. If that's not possible, don't put the computer directly under the sprinkler. Keep a waterproof tarp or plastic drop cloth nearby. Train employees to throw the tarp over the equipment in the event of a fire alarm.

Conventional extinguishers are filled with water, carbon dioxide or dry chemicals. Water and dry chemicals will damage the equipment. Carbon dioxide smothers the fire's supply of oxygen, but also your employees' supply of oxygen. Moreover, it is very cold and can shock electronic equipment. But fire extinguishers filled with

halogenated hydrogen, known as Halon, leave no residue. Halon interacts with the combustion process itself to put out the flames. Halon extinguishers come in virtually any size and should always be your first choice in the computer room.

Don't forget to drill your staff in the use of the extinguishers after installing them.

Housekeeping. Minimize the storage of paper and other combustibles near the computer. Do not allow smoking in the same room with the equipment. If you do any remodeling, or install interior partitions or furnishings, choose flame retardant materials.

Fire detection devices. Install both smoke detectors and heat detectors. Early detection is a major factor in limiting damage, and detectors are quite inexpensive. Often they will pay for themselves in reduced insurance premiums.

2. Water Damage Protection

If your computer is located in a basement, or if you have an automatic sprinkler system, you should consider a water detector. Water damage is a real possibility in most buildings. Teach the staff how to shut down the equipment and cover it in the event of leaks or flooding. Paper stock should be stored on shelves if the floor is subject to flooding.

3. An Annual Safety Audit

Perhaps your most valuable preventive measure is to give your operation an annual safety audit. Its purpose is to identify your weaknesses, so you can minimize them. The worksheet at the end of the chapter lists most of the important questions you should ask yourself. Take a few moments to fill it out.

Disaster Recovery

As explained above, fire protection, water damage protection and an annual

safety audit are three simple steps you can take to reduce the chances of a computer catastrophe. But what if a disaster does strike?



The object of a recovery plan is to make sure that your business can still function profitably if the computer breaks down.



Few computer owners realize how dependent their company has become on the computer until a serious problem occurs. **Needed:** a plan to get you up and running as soon as possible after a disaster. The object of a recovery plan is to make sure that your business can still function profitably if the computer breaks down. Ideally, a plan should address the four key areas outlined below.

1. Software Backup

If disaster strikes, you will rely heavily on your backup programs and data files. These assets are crucial for disaster recovery. The other things you need—people, equipment—you can get somehow. But if you lose your programs and data, you can lose it all.

A complete backup plan, including off-site storage of key programs and data files, is the cornerstone of any disaster recovery plan. If you do nothing else, do

this. (Refer to Chapter Three for a discussion of program and data backup.)

2. Hardware Backup

Ideally, you should have arrangements for use of an alternate computer in the event yours is out of service for an extended time. Here are several suggestions. Most small computer users would be wise to look into all of them.

Redundant computers. As you grow, you will expand your computer system. Many small computer users choose to do this by purchasing one or more additional small computers identical to the original machine. This gives them some measure of protection from disasters. True, they will still have problems if, let's say, the building burns down and all the machines are lost, but if only one machine goes down, the others can usually take up the slack.

Redundant computers are more practical if you have an alternate way to handle non-critical applications when problems occur. Consider, for instance, a company with two computers, one for inventory and the other for word processing and accounting. If one computer is damaged, this firm could drag out its electric typewriters for word processing and shift its accounting to an outside service company. The remaining computer would then be free to run the critical inventory program.

Service bureau. Some outside service companies will sign agreements to provide backup if your system goes down. This is easiest if you used a service company before moving to your own in-house equipment. In the event of a disaster, you can return to your old system until you are back on-line.

Service companies will charge you a retainer to guarantee immediate backup. Even if you can't afford the retainer, it's not a bad idea to do a little research to get the names of several local firms who can handle your applications. If an emergency occurs, you may be able to take some of the pressure off by engaging a service company to temporarily handle such things as payroll and accounts

receivable.

The “buddy” system. A reciprocal agreement with another computer user is an economical way to get hardware backup. The “buddy” system is no more than an old-fashioned mutual-aid pact. You and your “partner” agree to provide backup facilities for each other. Usually, you will have to come in after hours or on weekends, but this inconvenience may be much better than doing without a computer at all.

A buddy can come in handy for small problems as well as for major disasters. If you lose your printer, for example, you could take your diskettes or tapes to the buddy for printout. Your vendor may be able to help you locate other companies in your area who use the same equipment you do. A user’s group is another way to find a compatible partner. We recommend that you find several buddies. If one drops out, changes computers or cannot handle all of your emergency needs, you will still be protected.

You and your buddy should agree that you will use the backup only for key applications. Things such as payroll and word processing can generally be taken care of by hiring temporary clerical help or by engaging an outside service company.

Make sure your backup system has all the capabilities you need. If you must have letter-quality printouts, then a system with a thermal or dot-matrix printer may not be very useful. Here are some other things to look for when selecting a buddy:

- Similar hardware configuration
- Use of same operating system
- Non-competitive business
- Written agreement

Once you’ve established a reciprocal agreement, you’ll need to review it at least

once a year, preferably every six months. Your plan will be worthless if the other company has doubled its work load and can no longer spare the time to accommodate your backup needs. Likewise, they may have changed their hardware or software so that they can no longer run your applications.

3. Insurance

Despite precautions, disasters occur, wreaking financial havoc. Adequate insurance should be secured to insulate your firm against the economic consequences.

Review existing insurance policies to see if they cover your computer equipment. If you rely solely on your standard property insurance to absorb the cost of a computer disaster you may be sorely disappointed when it's time to collect. You will probably need to add a special "rider" to your current office equipment coverage, or add a separate policy for the computer.

Specialized data processing policies are offered by several major insurance companies. They offer coverage not available in a standard property contract. A good policy should cover loss from theft, burglary, vandalism, fire, flood and other disasters and be written for the full replacement cost of the equipment (not its "depreciated" cost). It should include protection for software and supporting materials, too.

Another common feature is extra expense coverage. You are compensated for the increased costs of operating while the system is down, such as hiring temporary workers to re-enter lost data or manually performing a previously computerized task. If you can afford the premiums, you can also buy business interruption insurance to compensate for the revenue you would lose while the computer is on the blink. Most small computer owners, however, will find business interruption coverage too expensive.

Don't ignore computer insurance. We know of a Vermont fuel-oil dealership that lost its small computer in a fire. Unhappily, the firm had neglected to update its

policy to reflect the increased value of the property after the computer was installed. Each of several people thought that someone else would take care of insurance. The company had to absorb most of its \$40,000 loss.

If you are on a tight budget, you can save money by taking a larger deductible than the standard \$500 to \$1,000. In addition, many insurance companies consider security precautions a plus. The presence of smoke detectors and burglar alarms can cut premium costs. Similarly, storing backup tapes off-site can also save money. If you have completed the worksheets from this and the preceding chapter, be sure to show them to your insurance agent—they may act as evidence of reduced risk, thereby trimming your premiums.

No matter what kind of insurance you get, don't rely on it to the exclusion of other disaster planning. A large insurance payment is little consolation if your company goes out of business. No matter how much insurance you buy, you still need disaster planning. Below you will find a box describing a small computer insurance program offered through the Association of Computer Users.



IDEAS YOU CAN USE



The ACU All-Risk Small Computer Policy

Most ordinary business insurance policies treat computers like typewriters. They cover damage to the machinery, but not to the all-important data it stores. Most policies have no provisions to cover the time and effort of replacing that data.

Then what about computer insurance policies? Although they take the computer into account, most of them are designed—and **priced**—for large data processing

installations. They usually do not meet the needs and budgets of small computer users.

In response to this situation, the Association of Computer Users developed a unique insurance plan that treats small computers like large computers . . . at a reasonable price.

What The Policy Covers

The ACU All Risk Small Computer Policy covers five key areas *that have never before been insured together*:

1. Direct physical damage to your computer, your media, your programs, your data stored on the system, your documentation and your source materials.
2. Accidental erasure or loss of data.
3. Dishonest acts, fraud or misuse of your computer by employees or outside parties, if these acts result in the loss of money, data, proprietary information, equipment or other property.
4. Damage to your computer from external electrical problems such as spikes, brownouts or power surges.
5. Extra expenses to continue your business as a result of a covered loss.

The policy covers the actual cost of repairing or replacing your property, without any deduction for depreciation.

For More Information . . .

ACU cannot act as an insurance agent, but it can arrange for a licensed agent who is familiar with the policy to write the coverage for you. To get more information, or to apply for a policy, contact the Association of Computer Users, 4800 Riverbend Road, P.O. Box 9003, Boulder, Colorado 80301, (303) 443-3600.

4. Written Procedures

Disasters are infrequent, but even minor accidents can be devastating if you are unprepared. Putting your recovery procedures down in writing can make problems much less formidable. This holds true even for "minor" emergencies such as damaged equipment, power loss, lost files, etc.

The recovery plan worksheet at the end of chapter won't take long to fill out, but it can save you hours of grief in the event of a disaster large or small. A written plan can be a life-saver if difficulties arise while top management is away. The plan can also be used as a training aid if it lists such things as emergency procedures, fire exit locations, fire extinguisher locations, etc. Give it to new computer employees and ask them to read it through. This simple step could possibly save you thousands of dollars.

For instance, a small computer user on the East Coast had his \$25,000 system saved by an alert operator who had been trained in emergency procedures. She noticed a few drops of water coming through the ceiling. Quickly shutting down the computer, she covered it with a waterproof plastic sheet. Within minutes water was pouring from the ceiling (a pipe had burst), but the computer was kept safely dry.

You will note that the worksheet asks you to list your critical applications. These are the ones on which you should concentrate your recovery planning. Consider each application that's now on the machine. How would its loss affect cash flow? Customer service? Your competitive position? Convenience of operations? Legal and regulatory requirements? Try to rank the computer's functions in order of importance. You will probably want to focus your plans on the top three.

You don't have to overdo your recovery plan. It should be written down, but it can be brief and uncomplicated—under five pages of guidelines, not a book. You can keep it in the back of the problem log we suggested in Chapter Three. That way employees will know they have just one place to look no matter what the size and nature of the difficulty. Keep a copy of the plan off-site in case the original is destroyed.

As you've seen, disaster planning for small computers is neither complex nor expensive. We strongly urge you to take steps to prevent all the problems you can

and prepare for those you can't. You're playing with fire if you use a small computer for business without a plan to recover from emergencies.

Where To Get Additional Information About Disaster Planning

This chapter outlines a disaster planning approach for small computer users. The larger the company, the greater the need for more elaborate planning. For more information about this subject, contact the organizations below. You should also get in touch with your insurance agent. Many insurance companies will inspect your building for fire hazard for no charge and suggest improvements.

**American Society for
Industrial Security**

2000 K St. N.W.
Washington, D.C. 20006
(202) 331-7887

Computer Security Institute

5 Kane Dr.
Hudson, MA 01749
(617) 562-7311

Data Security Workshops

6 Swarthmore Lane
Dix Hills, NY 11746
(516) 499-1916

EDP Security

181 West St.
Waltham, MA 02154
(617) 890-6666

Fenwal, Inc.

400 Main Street
Ashland, MA 01721
(617) 881-2000

**Management Advisory Service
and Publications**

P.O. Box 151
Wellesley Hills, MA 02181
(617) 235-2895

Management Dimensions

185 E. Garfield Ave.
Pomona, CA 91767
(714) 623-3569

Marsh & McLennan

1221 Avenue of the Americas
New York, NY 10020
(212) 997-5201

**National Fire Protection
Association**

470 Atlantic Avenue
Boston, MA 02210
(617) 482-8755

WORKSHEET #9 (a)**SAFETY AUDIT**

Photocopy this worksheet and use it annually to review your company's operations. A "Yes" answer to any question means you already have such a safety measure in place; a "No" means you do not. After completing the worksheet, consider each "No" in detail to see if it indicates a weak spot that needs corrective action.

| | YES | NO |
|--|--------------------------|--------------------------|
| Do you have magnetic backup of important programs and files, plus paper backup of software documentation and important lists (customers, suppliers, etc.) stored safely off-site? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have smoke and heat detectors in the computer room? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have halon fire extinguishers in the computer room? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you have emergency lighting? If it is not automatic, do employees know where it is and how to turn it on? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do employees know what to do first, who to notify, which equipment to protect and how, which exits to use and other procedures in the event of a fire? | <input type="checkbox"/> | <input type="checkbox"/> |
| A flood? | <input type="checkbox"/> | <input type="checkbox"/> |
| An earthquake? | <input type="checkbox"/> | <input type="checkbox"/> |
| A serious electrical shock? | <input type="checkbox"/> | <input type="checkbox"/> |
| Has the entire staff been trained to use the fire extinguishers? Do they know the differences between the kinds of extinguishers and which ones can be used where? | <input type="checkbox"/> | <input type="checkbox"/> |
| Does everyone on the staff know where the emergency power switches are located? | <input type="checkbox"/> | <input type="checkbox"/> |
| Does everyone know where the plastic drop cloths are located and how to use them to prevent water damage to equipment? | <input type="checkbox"/> | <input type="checkbox"/> |
| Does everyone, including clerical operators, know how to shut the equipment down properly to avoid damage or lost files? | <input type="checkbox"/> | <input type="checkbox"/> |
| Does everyone know what to take with them in the event of a fire or flood that forces them out of the building? Have you identified, for instance, the essential program disks that should be brought along? | <input type="checkbox"/> | <input type="checkbox"/> |

(Continued)

WORKSHEET #9 (b)

SAFETY AUDIT

| | YES | NO |
|--|--------------------------|--------------------------|
| Are emergency numbers (fire department, ambulance, police, equipment repair, owner's home phone number) clearly posted near the phone? | <input type="checkbox"/> | <input type="checkbox"/> |
| Has everyone on your staff reviewed your recovery plan at least once this year? | <input type="checkbox"/> | <input type="checkbox"/> |
| Have you reviewed your hardware backup plan this year? Are your backup facilities still available and compatible? | <input type="checkbox"/> | <input type="checkbox"/> |
| Have you checked on housekeeping this year? Is the building free of combustible materials, dust, contaminants, and other hazards? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are paper and other combustibles prohibited in the computer area? | <input type="checkbox"/> | <input type="checkbox"/> |
| Have you held a fire drill this year? | <input type="checkbox"/> | <input type="checkbox"/> |

WORKSHEET #10**DISASTER RECOVERY PLAN**

Use a separate piece of paper to write down your recovery plan. Make sure each employee reviews this at least once each year. Your plan should list or explain the items shown below.

- Guidelines for emergency shutdown of computer equipment.
- List of fire exits, location of fire extinguishers.
- Location of emergency power switches.
- What each person should take along in the event the building must be abandoned.
- If you have a mutual-aid arrangement, list location of backup computer and telephone number of person to contact.
- Location of off-site software backup and telephone number of person to contact.
- Location of temporary office space if present location cannot be used and telephone number of person to contact.
- Names and phone numbers of key outside individuals (accountant, hardware vendor, software vendor, service representatives, computer consultants, contract programmers, cleaning services, temporary help agency, suppliers for new forms and magnetic media, etc.)
- Location of list of customers that must be notified if the computer problem will create delays.
- If the computer were to shut down completely, which operations would be most critical? List the top three.
- List of less urgent computer tasks and functions that can be set aside if necessary to get critical applications taken care of. List in order, beginning with least important.
- If data files were lost, where would you get the information to bring the critical applications back up to date? (For example, do you keep written invoices that could supply the information you needed if you lost part of your inventory program? Where are they kept?)

Section III:

| | | |
|--|---|---|
| 6 Building An In-House Computer Staff | 7 Managing A Programming Project | 8 Increasing Programmer Productivity |
|--|---|---|

How To Manage The People Side Of Your Small Computer

*Take some pointers
on how to make your people
as productive as your hardware . . .*



Section III covers the little known people problems that often accompany computerization. Don't ignore these chapters—people problems can sabotage even the finest computer system.

For instance, Chapter Six, **Building An In-House Computer Staff**, is filled with suggestions for hiring computer personnel as well as the retraining of your current staff. Chapter Seven, **Managing A Programming Project**, leads you through a step-by-step approach to dealing with the complexities of planning and implementing a programming project. Chapter Eight, **Increasing Programmer Productivity**, gives you common sense tips on how to make those programmers as productive as possible.

Read these chapters to discover the low-cost methods other computer owners have used to make their people as productive as their machines.

Chapter Six

Building An In-House Computer Staff



*How To Avoid The
Headaches Of Finding
Data Processing Personnel*

We aren't going to pretend that it will be easy for a small computer owner to find data processing personnel. It's going to be tough. But we do think your job will be much easier if you adapt some of the little-known techniques explained in this chapter. These techniques can give you an edge.

You'll need that edge because you will encounter intense competition when you go looking for technically trained personnel. Computer people are in such demand that large corporations are offering inflated salaries and bonuses. A small computer owner must vie with the rest of the world for a very scarce commodity.

A small or medium-sized business can't match the economic incentives doled out by the giant firms. Yet if it trains an unskilled person from inside the company, that individual may depart for greener pastures not long after training is completed. Because of the skyrocketing salaries and the revolving-door mentality, a small

computer user is going against the economic current when it comes to finding data processing employees. Whether you sink or swim depends on devising special tactics to finding and keeping computer personnel. Luckily, there are a few low-cost techniques that you can use to locate and retain a high-quality computer staff.

When To Hire Computer Personnel

When should you consider hiring computer personnel? *Not until you absolutely have to.* **Our basic advice:** Do without technical employees as much as possible, for as long as possible. Many small computers don't need specially-trained operators. If the software has been written to be "user-friendly," then a normally competent employee should be capable of running it with occasional supervision from the manager.

But some small computer managers tell themselves, "I don't want to get involved in this technical stuff. My time is better spent elsewhere." To a degree, this is a wise comment; the business owner or manager should not be the one sitting in front of the screen typing in data. But someone high in the company must become the in-house computer expert. Although this individual need not learn to program, he or she must become familiar with the computer, and keep up-to-date with the changing marketplace.

Still, as time goes by and you expand your uses of the computer, there will come a time when you simply cannot spare more hours. Even in such cases, we recommend postponing the hiring of technical employees if at all possible. First, examine your needs to see if they can be solved another way—increasing overtime, modifying schedules, reassigning job duties, purchasing additional time-saving software, etc.

Next, investigate outside programmers and consultants as an alternative, however temporary, to bringing someone in-house. Although outside programmers—also called "contract programmers"—may seem more expensive

than having an employee do it, the comparison is not realistic because the manpower is often unavailable to a small computer user. It could take months to locate someone suitable. When he or she is found, the individual is likely to leave within the first six months. Given these probabilities, an outside programmer or consultant can save time and save the cost of employment agency fees, benefit packages and lost productivity.



Because most small computer users don't have the financial resources to lure candidates with vast sums of money, they must be more creative in recruiting.



Recruiting Computer Personnel

Although you should try to postpone hiring skilled data processing personnel as long as you can, your small computer installation may eventually grow to the point where it becomes mandatory to have a full-time technical person on staff. How do you find such a person and convince him or her to join your firm?

Because most small computer users don't have the financial resources to lure candidates with vast sums of money, they must be more imaginative and resourceful when searching out prospects. Since the object of your recruiting

program is to secure the best person for the lowest cost, you should probably combine several of the methods suggested below.

One good method is through references. Many of your non-technical employees may know someone who is knowledgeable about computers. A worker who comes into your organization through a recommendation from a present employee often becomes productive more quickly. A reliable and loyal employee will rarely suggest someone who is undesirable.

Because referred personnel generally work out so well, some companies turn their employees into "bounty hunters." These firms offer money or prizes for bringing in a new recruit. Cash bonuses or free trips are an excellent incentive. The extra expense is offset by the higher quality of the new personnel and by eliminating advertising and agency fees.

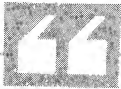
Here's another excellent source of computer personnel: local schools and colleges. Often, this is the most inexpensive way to find a technically-trained employee. A note of warning—a few four-year colleges have excellent programs, but college graduates with computer science degrees often do not work out as small computer staffers. They may get bored easily with typical business programming and leave to find more demanding work. The turnover rate for computer science majors is disturbingly high. Often, they are trained only in theory, not in solving real-world business problems.

So many of your best employees may come from junior colleges, trade schools or the armed forces. Junior colleges usually attract many adults who have worked for a few years and now want to broaden their career outlook. Private trade schools give more practical courses and offer more hands-on experience. The computer training given by the armed forces is generally good, as well, although it is sometimes too specialized to apply to business users.

One of the most overlooked sources of data processing employees is handicapped people. More and more companies are discovering that the handicapped make competent computer professionals. They are conscientious, loyal

and often outperform non-handicapped people because they are more determined.

Obviously, there are special considerations when hiring such people. The greatest problem is not the handicap, but rather gaining acceptance from other employees. Educating the current staff and overcoming negative stereotypes takes some advance planning. Moreover, most handicapped people need special equipment and facilities to do their work: ramps or special toilet facilities, for example. Once these are provided, however, they can generally work as independently as any other employee.



Many good organizations report that handicapped people working at home have become valuable assets.



One good way to work with handicapped computer people is to supply them with a terminal and allow them to work at home. They can be very productive in such cases. Many organizations report that handicapped people working at home have become a valuable asset, when paid on a per-job (rather than a per-hour) basis.

IDEAS YOU CAN USE

Where To Recruit Computer Personnel

- If you recruit from colleges and trade schools, evaluate the curriculums to gauge how immediately productive the graduates will be. Find out what programming languages students must learn—some schools teach languages that are fine for scientific tasks, but are of little practical value in business situations. Find out what equipment the students practice on—is it similar to yours? Find out how vocationally oriented the courses are—how much hands-on experience does an individual have at the time of graduation? You may be surprised to find that the curriculum at many private trade schools is superior to that at some four-year universities.
- You can locate potential computer employees by contacting the placement office at special schools for the handicapped. You should also get in touch with government agencies and non-profit groups. The Rehabilitation Services Administration and the Veterans Administration can help employers find applicants, as can the National Association of the Deaf, the National Federation of the Blind and the National Amputation Foundation.
- Data processing programs are now offered at many high schools. Some of them aim at giving students vocational skills. Recent graduates can make good entry-level employees (operators, data entry, etc.) In a few cases, high-school “whiz kids” have made valuable contributions to small businesses who were willing to take a chance on their programming skills.
- You should consider giving computer employees their own wage-and-compensation plan so that they are not subject to standard salary restrictions. Many companies now administer data processing salaries separately to avoid losing valuable employees.
- Some colleges have “co-op” or “intern” programs, where students work part-time in local businesses as part of their education. Often they are closely supervised by a faculty advisor. Co-op programs are an inexpensive source of data processing expertise. In a few cases, students have gone on to work for their co-op employer after graduation.
- Contact your local Boy Scouts of America office and ask to speak with the head of the Exploring Division. Teenage Explorers are frequently trained at “Computer Posts” sponsored by firms like IBM and Honeywell.

Recruiting From Within

You may also want to consider training one of your current non-technical employees to assume a portion of the data processing duties. This approach, however, has serious liabilities for most small computer users. Few companies have the resources to train technical personnel. Although it is always possible to send your people to night school, it can take months or even years before the people become technically proficient.

Not only is it expensive and time-consuming to train your own technical staff, it is also risky. As many users have discovered, once these people are trained, they take their new-found talents elsewhere. Still, internal promotion should be on your list of possibilities. If the computer operator or data entry clerk is motivated enough to pursue some training, it might behoove you to give him or her a chance to use it on the job. Such a person could be a valuable source of additional help.

And what about simply advertising in the paper? Although this might be the first thing that occurs to you, it should probably be your last choice for recruiting computer professionals. Because newspapers reach such a broad audience, you will have to carefully screen the resumes you receive. Moreover, the smaller classified ads tend to be read by people who are unemployed. Very few good technical people are unemployed these days, unless they just don't want to work.

If you do decide to try advertising, we suggest a larger display ad in the specialized section for professionals, or in the "computer" section of the classifieds. Another good idea is to place an ad in the back of one of the many trade journals for computer pros. There are a half dozen weekly publications that will serve your purpose.

Last, and probably least for most small computer users, comes the professional recruitment agencies. All major metropolitan areas have agencies specializing in data processing. Their high fees are frequently beyond the budgets of most companies, generally starting at about 10% of annual salary. On the plus side,

however, they generally screen candidates in advance. By maintaining files of qualified people, they may be able to respond with an applicant sooner than other sources. Moreover, they may have access to individuals who are not actively seeking employment. Whether you should use such agencies depends upon how rich you are or how desperate!

Retaining Computer Personnel

But it's not enough to work hard at finding good computer personnel. You must also work to keep them on board, or someone will steal them away. Many small computer users just don't realize how hungry major corporations are for data processing workers. You can't treat computer employees the way you treat the rest of your staff.

And you can't pay them the same way, either. There's just no way around it: You're going to have to spend to get good computer personnel. And you'll have to keep on spending. Keep on top of local wage conditions and don't make the mistake of lumping your computer people in with other office employees for an annual raise. If you don't review and adjust salaries twice a year or so, you will probably lose your employees to other companies. In many cases where a good employee has been lost, it has cost a much more substantial salary for replacement.

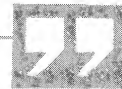
The Yearning For Learning

There are other ways besides higher salaries to retain computer personnel. Most fall under the general heading of job enrichment—creating a positive work climate. Just like other professionals, data processing employees need to see a place to

grow, a level above their own to which they can aspire. Workers who feel they are locked into a dead-end slot will eventually leave. They need a chance to grow and develop new skills.



Just like other professionals, data processing employees need a chance to grow.



Since most computer employees are eager to keep up their professional skills, training is one incentive to stay. That training can be in areas such as hardware, software, applications, general business or management. You can offer in-house training, or you can reimburse employees for the cost of outside job-related courses and seminars.

Employees' desire to increase their knowledge and skills can work to your advantage. Small computer users are often able to offer broader exposure than large shops, where the staff is forced to specialize. But this won't happen by accident. Be sure to emphasize the variety of challenges your new employee can

expect to face. Your personnel plan should provide multiple levels with opportunities to move up every six months or so (even if it is only to a new, fancier title). Along with those new titles, you may want to include some executive-type benefits. Like all of us, technical people are attracted by company cars, private offices and other status symbols.

Because it takes some special skills to spot good technical employees and convince them to join your company, we have included a separate discussion of interviewing techniques below. For further help managing and working with programmers and other technical people, refer to the following chapters on improving programmer productivity and working with outside programmers.

IDEAS YOU CAN USE

Improve The Aim Of Your Hiring Squad

With the current shortage of computer workers, it's frustrating to locate a good prospect and then be unable to bring him or her on board. Interviewing and hiring data processing people demands some special know-how. Many small computer users have inadequate hiring techniques. If your firm is missing the mark too often, the tips below may improve your hiring rate.

- Initial contact is important. Strong candidates may have a dozen companies bidding for their services. If you feel strongly about a prospect, telephone immediately or send a telegram as soon as you get the resume in the mail.
- Make arrangements to interview on weekends and evenings. Many prospects look while still employed. If your company is available during off-hours, it's easy for the candidate to consider your offer without disrupting their current situation.
- Plan your interview in advance. Ask each candidate the same questions. Unstructured interviews encourage seat-of-the-pants hiring decisions.

If possible, select an interviewer with the technical knowledge to question the DP candidate on his or her own level. If no one in your company fills the bill, ask a friend,

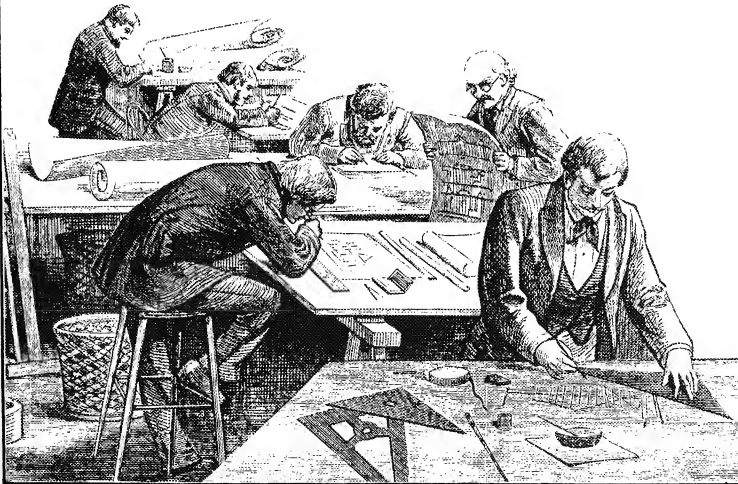
colleague or consultant to sit in on the interviews to evaluate the technical expertise of the finalists.

- Observe common-sense courtesy during the interview. Don't keep the applicant waiting, don't allow frequent interruptions and don't turn the session into an inquisition.
- Pay attention to spouses. They often make or break the deal, particularly with out-of-town applicants.
- Be ready to make an offer. Even a day or two can mean losing a computer worker to another company.
- Go with the fairest offer you can make the first time. Don't negotiate. Upgrading your initial offer usually leaves a bad taste in everyone's mouth.
- The candidate is sizing you up, too. Don't be afraid to sell your company and its benefits. On the other hand, don't oversell. Promise only what you can deliver. When you make promises based on contingencies outside your control (" . . . and if the economy improves, we'll buy you another computer . . ."), the promise is remembered but the contingency isn't ("Where's the new computer you promised me!").
- Don't fall into the hit-or-miss trap. Develop a comprehensive job description so you know what kind of person you are looking for. Outline the skills needed, even if this means doing a bit of research about unfamiliar computer positions. You can't expect to hit the mark if you don't know what your target is.

If you need help coming up with job descriptions, determining salary levels, or choosing employees, check with national agencies like SOURCE EDP (see the yellow pages for the nearest office.) They often have free salary surveys, sample job descriptions and informative brochures.

Chapter Seven

Managing A Programming Project



*How To Save A
Bundle When
Working With
Programmers*

Small computer users usually have no game plan for managing contract programmers . . . and it shows. Consider these real-life case histories:

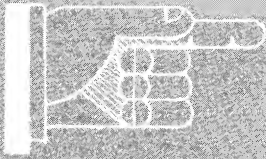
- A Texas warehouse distributor hired a software firm to design an order entry program. The programmers came up with an easy-to-use system that featured menus, fancy screens and all sorts of user prompts. But the user forgot to mention that most of his orders come in during the same week each month. Although the software worked fine while orders came in slowly and steadily, it bogged down hopelessly under peak loads. Because he hadn't adequately defined his needs, the user had to pay for a costly rewrite.
- A West Coast public utility hired an outsider to code an important program.

When the due date rolled around, the company learned to its dismay that the programmer was still several months from completion. Because it failed to monitor the project's progress, the client firm had to bring in additional manpower on a rush basis to meet its deadline. An expensive mistake.

- A Wisconsin fuel oil dealer bought a small computer and hired an independent programmer to develop software for delivery scheduling. As soon as the programmer told him the project was finished, the dealer paid his office staff overtime to type in all his historical records and customer information. Unfortunately, the dealer didn't really test the programs before paying the programmer off and converting his data. To his chagrin, he found that his information was "trapped" in the computer because of programming errors. He had to convert back to his manual system during his busiest season. Meanwhile, the programmer had disappeared with the dealer's \$20,000.

Most small computer users will eventually need some custom programming done for their machines. It may be a simple modification to an existing packaged program, or it may be a complex system built from scratch. Unhappily, most users don't have the know-how to successfully manage programming projects, regardless of the size. The result is often a cost overrun or even complete failure.

Needed: A simple scheme for supervising programmers. You'll find our suggestions in this chapter. We have slanted the discussion towards the use of outside or "contract" programmers, since most small computer users turn to these freelance consultants when they need programming help. Some of you, however, may have in-house people with programming know-how. Most of the techniques outlined below apply equally to in-house projects.



CONSUMER ALERT

What Every Small Computer User Should Know About Programming Contracts

Talk to other small computer users about contract programmers and you'll quickly find out that (1) they're expensive and (2) they often fail to keep their promises. Yet most users don't take the necessary steps to safeguard themselves. They rely on verbal promises and a handshake.

Unhappily, some programming vendors take unfair advantage of naive computer users. If you plan to gamble any of your money on outside programming, protect yourself with a carefully prepared contract. A contract is essential whenever you hire an outside programming vendor for more than a day or two. On the next page you'll find a checklist of important provisions that can serve as the starting point for your contract.

The checklist is not a substitute for legal advice, merely a guideline to ensure you haven't missed any essential points. Be sure to get an attorney's help to prepare your contract, at least for your first contract. Once a standard format has been developed, you may be able to use it as a framework for future agreements.

As you create your documents, remember that it's more than legal protection in the event of disagreements. Ideally, it will help you avoid disagreements and problems in the first place. Think of the contract as a blueprint of the programming effort, a plan that carefully lays out everyone's proper roles.

If it's done right, the contract will give the vendor incentives to be on your side. Things such as payments phased to milestones, bonuses and penalties make it less expensive for the programmer to perform than not to. Indeed, most software companies will welcome a contract (although they're unlikely to agree to every provision shown below). They don't want to go to court any more than you do.

Writing up a contract also forces you to prepare properly for the upcoming software development project. When you face the vendor across the bargaining table, you'll be ready with a list of logical, specific demands. You'll have all the cards on the table right from the start. And, because you had to write them down in the contract, you'll have a detailed description of everything you want.

Remember—if it's not in the contract, you're probably not going to get it without paying more money. We know of many cases where users forgot to specify important items—documentation, for instance—and had to pay extra to get it.

Fifteen Crucial Contract Clauses

1. What The Vendor Is Expected To Do—The Scope Of The Project

This is the most important clause, and the one most users fail to write properly. The key to any contract is specifying what the vendor must do, both in quantity and in quality.

Without detailed specifications in the contract, the vendor's only real obligation is to deliver a program—*any* program. You may get stuck paying for a program that doesn't do what you wanted it to because you failed to spell out your requirements in writing.

One good way to get started on this clause is to attach the vendor's original proposal to the contract. Then you can enforce the representations made in that proposal. Some vendors, however, will balk when asked to make their promises part of the written agreement. At the very least, try to incorporate the proposal's general commitment about performance, not-to-exceed prices, hardware compatibility and capacity.

Don't settle for naming the applications and a few general features. Describe the features and the reports you want. Include sample outputs. Give details of the results you want: "The system will process 500 accounts receivable and deliver an aged trial balance within 30 minutes." Include in your contract that the vendor should provide file layouts, flowcharts, programmer's documentation, user manuals and anything else appropriate.

But maybe you don't have any specifics yet. Perhaps the design of the system is part of the job for which you are hiring the programmer. In such a case, use a two-stage approach. Put in as much detail as you can now. Insist on the right to approve the final design before proceeding with the actual programming. Reserve the right to terminate if you don't like the design. (See the Right To Terminate clause described under point 14.) The accepted final design can later be incorporated into the contract.

2. When The Vendor Is Expected To Do It—The Time Table

The major events—the design, the coding, the testing, the documentation —should appear in the contract with deadlines. You should also include your remedies and rights if the vendor fails to meet these milestones.

3. When The Vendor Will Be Paid—The Payment Schedule

Don't give away your money up front! Your payments are your only real leverage to guarantee performance. Link all payments to the completion of a task. Retain a portion of the final payment until the system has been fully operational for a given period of time. In this way, the vendor has a stake not only in the actual programming, but in the installation and training phases as well. *Always tie payments to performance.*

Require all expenses such as travel to be approved in advance before you are liable for payment.

4. Who Owns The Product

Serious misunderstandings can arise if this clause isn't crystal clear. Without an agreement to the contrary, the 1978 Copyright Act could be construed to give an independent programmer the rights to the software developed for you.

Does the vendor have the right to sell the programs created for you? Do you have the right to sell the software? Who owns partially completed programs if the vendor doesn't finish the job? If you hire programmers who are moonlighting from another job, employment agreements may give their primary employer the right to any software written by the moonlighters. Get these issues resolved in writing.

5. The Vendor Will Not Disclose Your Trade Secrets

In the course of the project, the vendor may have access to customer lists, trade secrets or other valuable information. The contract should spell out that all such data remains your sole property.

6. The Vendor Is An Independent Contractor

Failure to clearly establish the vendor as an independent contractor can result in problems with the IRS. True, you can't satisfy the IRS merely by putting things in writing. But you can at least prevent the vendor from suddenly making claims as an employee and cashing in on workman's compensation, unemployment compensation or health-care and pension benefits. Moreover, these claims could subject you to government audit, back taxes and penalties.

If you want the tax advantages of an independent contractor arrangement, specify in the contract that the vendor determines the assignment of individuals to specific tasks; that he or she supervises individual programmers on a day-to-day basis, supplies the place of employment, determines the hours and other conditions, and controls who is hired to assist.

7. The Vendor Has Legal Responsibility For Anyone Who Works For Him or Her

Get in writing that the vendor accepts all legal and financial responsibilities for anyone who works for him or her. And ask for evidence that the vendor has complied with tax, benefit, insurance and bonding requirements.

8. The Vendor Will Not Recruit Your Employees

Both parties should agree to refrain from recruiting each other's employees for a specified period of time. Without this clause, the vendor may influence your precious DP personnel to give up their jobs in favor of freelancing.

9. The Vendor Will Allow The Client To Monitor And Be Involved In The Project

Some users hire outside programmers only to find that they refuse to let anyone "look over their shoulder." This has two bad consequences. First, the project may fall months behind before you discover the crisis. Second, if your people don't get involved, they won't know enough about the system to fend for themselves after the vendor leaves. Every problem that comes up will have to be referred to the vendor—who will charge you to come back and solve it.

Insist on start-to-finish involvement in the programming effort.

10. The Vendor Will Deliver Periodic Progress Reports.

You have a right to expect bi-weekly progress reports in writing. If you don't make it a contract requirement, a busy vendor may balk. Insist that the programmer communicate in non-technical language.

11. The Vendor Will Train The Client's Personnel To Use The System

You may be no better off than before if the vendor merely dumps the software on your desk and leaves. Try to get a commitment to have technical support before, during and after implementation. Part of that support should be operator training and user manuals.

12. The Vendor Will Give Your Warranties

The vendor should grant you a warranty period during which he will correct all program errors. Try to get as long a period as possible. Define "errors" so there is no misunderstanding, and try to get the vendor to promise to attempt repairs within a specified time.

You should also obtain a warranty that the program will not infringe on any previous ownership rights. Include a "hold-harmless" clause running from the programmer to you.

13. The Client Has The Right To Test The System Before Accepting It

Before you go to the time and expense of full-scale installation and conversion, you should test the system. If the project is large, ask for demonstrations of each key section as it is completed. Smaller projects can usually be tested after delivery to the user's shop.

The test should duplicate as many real-life conditions as possible. Allow yourself plenty of time. Define in the contract what the test will consist of and how the system must perform to be acceptable. Many projects end in disaster because they are never completed. There is always "one last change." Be prepared to provide a detailed definition of completion and acceptance. Working out these things in advance eliminates bad feelings later on.

Acceptance tests should not preclude your right to have the system fixed if you discover bugs after installation.

14. The Client Has The Right To Terminate The Agreement

Be sure to get at least two options to terminate. The first will be at the end of each phase or milestone. If, for example, the vendor delivers an inadequate design, you should have the right to terminate without further obligation. Likewise, if the system can't pass your acceptance tests by an agreed-upon time, you should be free to cancel the balance of the project.

You should also have the option to terminate without cause. Your financial position may take a turn for the worse. Or you may want to cut yourself loose from a project that is hopelessly bogged down. Obviously, if you terminate without cause you will have to compensate the vendor for the efforts to date.

15. Both Parties Agree To Arbitration If Necessary

An arbitration clause may provide you with your only *practical* means of enforcing the agreement. Litigation is generally too time-consuming and costly to be of much help. But if both parties agree to submit disputes to binding arbitration, you stand a chance of compelling vendors to keep their promises.

The Need For An Overall Plan

Managing a programming project is difficult under the best of conditions. If you make mistakes like the ones described at the beginning of the chapter, the result can be financial disaster. To avoid getting caught in that quagmire, you—the user—must direct the operation from start to finish. Unhappily, the average computer user rarely has such an overall plan.

Although programming itself is a technical discipline, *managing* programmers is not. Most of it is common sense. We will lay out one common-sense method in this chapter. With it, you can take charge of a software development project and

make sure you get your money's worth.

One important technique underlies our method: *The user must hold quality reviews at key milestones. Payments to the programmer must be tied to those milestones.* The programmer should complete each one before getting paid and moving on to the next. You'll institute reviews during all three phases of a project: the Definition Phase, the Development Phase and the Implementation Phase.

Definition Phase

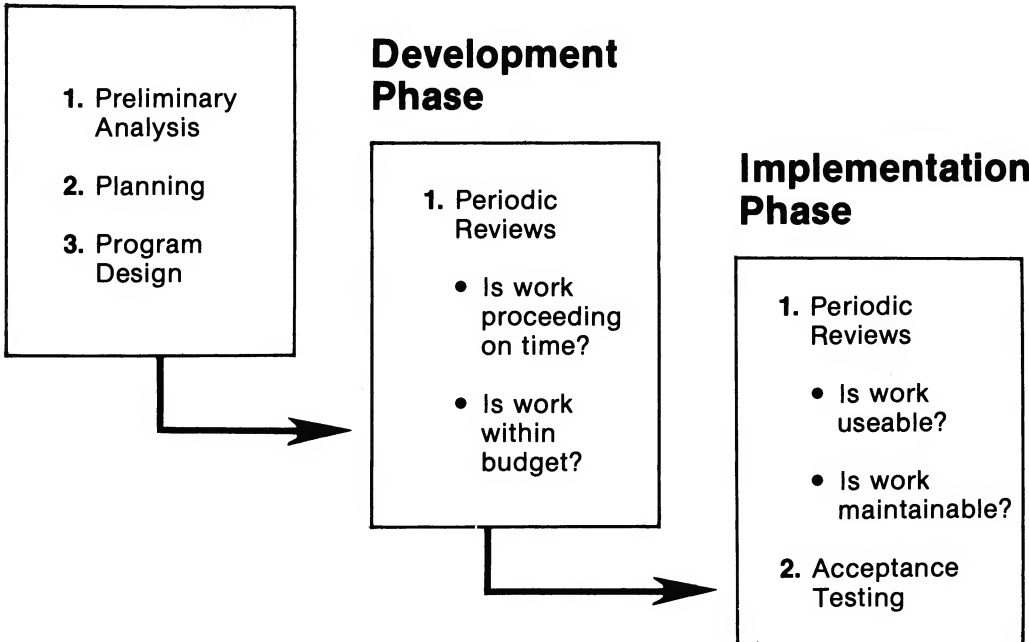
1. Preliminary Analysis
2. Planning
3. Program Design

Development Phase

1. Periodic Reviews
 - Is work proceeding on time?
 - Is work within budget?

Implementation Phase

1. Periodic Reviews
 - Is work useable?
 - Is work maintainable?
2. Acceptance Testing



“This all sounds like I have to get involved!” you say . . . and you are right. Yet without your involvement, failure is virtually guaranteed. If you don’t have the time, prepare yourself to be dissatisfied; at least you will expect it and not be frustrated.

Why Some Programmers Won’t Cooperate

Before we plunge into the details of our program, we should warn you that some programmers will resist the approach we suggest here. It includes too much early design effort and communication with the user. Some programmers prefer the trial-and-error method. They get a rough idea of what is wanted, then disappear to code the program. They test it, then disappear again to correct mistakes; test it again, correct again, and so on until a workable system is finally achieved.

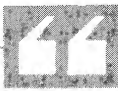
With the trial-and error method, you don’t discover misunderstandings until the coding is done. The programs you get are almost sure to require costly and time-consuming revisions.

Misunderstandings between programmers and user are inevitable. So are errors in the initial specifications. Expect them. Look for them *before* the programmer starts coding. The sooner you catch mistakes, the less money and time you will spend on corrections. That’s why this book’s approach to managing contract programmers emphasizes up-front design effort. You may spend more than half your time designing before any coding begins.

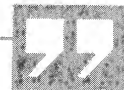
Indeed, the best way to work with a programmer is often to decide in advance what you want out of the system. From that, you can determine what information must go in (and what you want the input forms to look like). Once you know the desired input and the desired output, you can hire a programmer to make the “black box” (i.e., the programs) that fit in the middle.

There will be a lot less misunderstanding if you give the programmer samples of the output—the reports—that you want. Try to avoid the temptation to move on

before this phase is accomplished to your satisfaction. But don't be too surprised if some programmers don't want to cooperate. As a general rule, the more closely you can convince them to follow this plan, the better your chances for a successful system. The program rests on this key principle: the user must demand quality reviews at key milestones. We have set forth those milestones below, along with the key *tangible* results you should expect before you move on to the next phase.



The more closely you can convince programmers to follow this plan, the better your chances for a successful system.



The Definition Phase

The first part is listed on our chart as the "Definition Phase." Ideally, it is the process of narrowing down your needs until you and the vendor know exactly what you want before coding begins. This is done by (1) a preliminary analysis (2) a general plan for the system and (3) the detailed design.

Preliminary Analysis

Step One, which we have called the "Preliminary Analysis" on our chart,

involves several vendors (outside programmers). Your first step is to determine your basic business problem. This simple step is often overlooked. Don't invite the vendors in until you've defined the problem. Hold meetings with the staff who will be involved with the computer. Your initial "wish list" should include plans for your next few years' growth.

About your "wish list:" some users don't know enough about small computers to know what to ask for. That's one of the reasons we recommend starting with prepackaged programs before moving on to custom software. Even if you abandon the package because of its limitations, you'll learn a lot about what you do and don't want from your system.

You may need some help from a knowledgeable friend or from a consultant to make your wish list as complete as possible. Once you know what you want, you can meet with prospective vendors, who will respond with proposals for doing the work. The programming firms you consider should have experience in your industry. You want the programmer to bring significant expertise to the project, not to use it as a way to learn on your time.

Next, you will review the quality of the various proposals and choose the best one. This is your first quality review. If none are satisfactory, solicit new bids from other vendors.

Planning

Once you've selected a vendor, move on to Step Two, "Planning." The chosen vendor will interview you and your key staff members at some length to define your needs. From these interviews, they will prepare a general plan, a document listing the basic requirements of the new system, the recommended approach and the feasibility (also called cost-benefit analysis).

Since the general plan usually includes an estimate of costs for the remainder of the project, it acts as a proposal for continuation. After reviewing this proposal,

you have several options. *Don't let the vendor make you feel that you are locked in.* This is your second quality review. Consider all your alternatives before making a decision.

Option #1 — Go ahead with the project as proposed.

Option #2 — If the system does not live up to your expectations and you can afford to add on, expand the scope to include the new features you want.

Option #3 — If costs are too high, ask the vendor to “design to budget” by scaling back some of the system functions.

Option #4 — If the proposal seems out of line, it is not too late to change suppliers. The heavy expenditures of programming and installation have not yet begun. Don't go on if you are already unhappy.

Option #5 — Stop the project. If it is too expensive to get what you wanted, it is better to cut your losses now.

Design

Next comes Step Three— the “Design.” The programmer will translate the general plan into detailed specifications, a blueprint of all the system's programs, data files, inputs and outputs. Here's where many users sit back and relax. They assume the vendor understands their business. *The vendor doesn't.* If you want the system to fit your needs, you must stay involved.

Many users don't review the programs in detail until after coding, or even after installation. Don't make that mistake. As a general rule, changes made after coding cost 10 times more than those made in the design stage. You can save yourself big bucks by spending a few hours to carefully “desk-check” the specifications before the programmer sits down to start writing the line-by-line instructions. Insist on written specifications and don't let the programmer begin coding until you have reviewed these things:

Overall Design—Will it solve your business problems?

Data Design—What information must be entered? Can your operators provide it? What reports will come out? Are they adequate? What data is stored in the system? Are you keeping everything you need? Is your hardware large enough to handle the memory requirements?

Data Security—Ask about passwords, backup procedures, and verification procedures to ensure that your data can't be lost, damaged or stolen. Ideally, you should have your company's outside auditor involved at this stage.

Individual Program Design—Does each program do the job you need? Does it interact with other programs as required? You may want to involve your accountant or auditor here, too.

Error Handling—At each stage of each program, ask “What happens if the operator makes a mistake here?” Are the error messages easy-to-understand? Are recovery procedures adequate?

Screen Formats—Make sure the screens are designed for your operators' convenience, not the programmers. For instance, it often helps to make the screens similar to the previous manual forms to minimize retraining. And it is always wise to use a standard format so that operators don't have to learn new rules for each program. Ask the people who will be using the computer to approve the screen formats.

Documentation—Will you get both an operator's manual and technical documentation (source code, flowcharts, etc.)? The technical portion should be complete enough that another programmer could pick it up and make changes or repairs.

The Development Phase

When you take charge of the Definition Phase, you've already taken a giant step towards a successful software project. But don't be too smug yet. After defining

exactly what you want, you've still got to make sure that the vendor gives it to you on time and within budget. That means monitoring the Development Phase from start to finish.



At each stage of the program, ask
“What happens if the operator makes
a mistake here?”



Whether they are supervising in-house personnel or outside programmers, many computer owners seem to shy away from closely checking the status of the project. They often settle for status reports like this one:

“How are you doing?”

“Fine.”

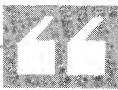
“Great, keep up the good work.”

Is it any wonder that users so often get unpleasant surprises at the end of the project? Cost and time overruns are common when the user neglects to take responsibility for monitoring progress. Effective, continuous project control is critical: completion dates, phased payments, milestones, measuring results. You must monitor progress, identify and handle problems and manage the project to the end.

Regular Status Reports

Insist on weekly status meetings and a written summary every two weeks. At first these may be technical and hard-to-understand. Persist in digging through the jargon to learn what is happening. Since it is too early to try out the programs, your quality reviews at this stage will focus on how well the vendor is meeting time and expense commitments.

Expect some problems and delays. At each two-week milestone, re-estimate and re-schedule the remainder of the project. It's not enough to review what's been done; you must periodically look ahead as well. Merely reviewing what's happened to date is like driving down the freeway with the windshield blacked over while looking through the rear-view mirror to see how you are doing. You have to stop once in a while, roll down the window, stick out your head, and look forward. Is the road straight? Are there potholes? Are you going uphill or down? And can you still reach your destination on time with the gas that you have left?



At first the status reports may be technical and hard-to-understand. Persist in digging through the jargon to learn what is happening.



The Implementation Phase

Let's sum up the quality reviews that we've discussed to this point. During the first phase of the project—the Definition Phase—you have three key milestones: the preliminary analysis, the planning, and the design. At all three milestones, your reviews concentrate on making sure the specifications spell out exactly what you want.

During the second phase—the Development Phase—you have periodic reviews, preferably at least every two weeks. Your main concerns are that work is proceeding on time and within budget.

During the final phase—the Implementation Phase—your reviews must discover if the programs that have been delivered are useable and maintainable. We suggest that you institute acceptance tests to discover problems *before* you go to the expense of switching to the new system.

Acceptance Testing

Acceptance testing is vital, but often neglected in the rush to get a system up and running. Although the programmer tests each program, additional tests by you are necessary. You want to find out how well the programs work using test data from your business.

Discuss the nature of your acceptance tests before coding begins. The programmers should understand that they must demonstrate the quality of the software before you will make your next milestone payment. Make it clear that the tests will involve actual company operators using actual company data.

The problems that turn up during these quality reviews—and there *will* be some bugs—should be corrected before conversion and before you make further payments. Debugging a program will be a joint effort between you and your programmer. In most cases, you will want to run the program in parallel with your

usual methods until the bugs have been discovered and corrected. The object of your testing will be to make the programs fail by any means that your operators might inadvertently use. The program should demonstrate that it is self-correcting and that it will bring back appropriate error messages rather than simply “crashing.”

Don't forget that your acceptance testing should include the documentation. Is the user section simple-to-understand? If you hire a new operator a year from now, will he or she be able to learn to run the system from this manual? Check out the technical section, too. Is it complete enough to allow a different programmer to make changes if necessary?

Converting To The New System

Your final quality review will occur after conversion. As you will recall from Chapter Two, conversion is the process of transferring your data from its present form into the computer. Plan in advance for conversion: who will enter the information, when it will be put in, how it will be checked for accuracy, how long you will continue your old system in parallel as a check, and so on.

Ask the programmer to remain on-site for a final quality review once all the data has been converted. The programmer should train your employees and correct all bugs that appear at this time. If the programmer is on-site during this start-up period you can generally expect to have the system up and running within a week or two.

Stay In Control . . .

After reading our suggested program for supervising programmers, you may be frustrated that so much work falls on your shoulders. “Isn't the whole idea,” you might ask, “to find a good programmer and turn everything over to that person?”

We wish it was that easy. Our research shows, however, that this method fails

more often than it succeeds. More than half the users who take the "I'll-leave-it-to-the-programmer" approach are *not* happy about the results . . . nor about the thousands of dollars they have spent.

So before you turn a team of programmers loose on your software project, be sure to develop a game plan for managing their efforts. Stay in control by instituting quality reviews at key milestones.

IDEAS YOU CAN USE

Don't Hire A Programmer Until You Can Master This Simple Skill

There is an easy-to-learn skill that is guaranteed to improve your success ratio on virtually any programming project: the skill of reference checking.

Contract programmers are very expensive. Rates for batch programmers of COBOL business applications range from \$22-50 per hour, while on-line programmers get an additional \$5-10 per hour. Systems analysts, the individuals who specialize in system design, get \$500 per day and sometimes more.

As if these inflated figures weren't enough, there is another reason why reference checking is crucial. In this young and unregulated profession, integrity and competence are sometimes at issue. Consider these real-life incidents:

- the contract programmer who charged custom software to install packaged programs;
- the software firm that deliberately underestimated the price to get the job, then cut corners, eliminated portions of the system and reduced testing to keep its profit margin up;
- the software company that abandoned a complex project halfway through. The programmers decided the job was a money-loser, so they walked out on the user and dared him to sue.

The dishonest programmers certainly get much of the blame for disasters like these. But some of the spotlight must also fall on the users. They hired those programmers. They had control.

Smart computer consumers use that control to negotiate a contract that protects their interests. You'll find hints on that job elsewhere in this chapter. Smart consumers also take the time to properly supervise the programmers they hire, as explained nearby.

And smart computer consumers check references—*especially* when hiring outside programming help. Reference checking means more than calling a few names to ask if they were happy. There are a few common-sense questions that will improve your chances of getting valuable information. For instance, you'll probably begin with a list of names supplied by the programming firm. When you call these names, ask for additional references. You may be able to get in touch with customers who are not on the firm's "safe-to-call" list.

Here's another example of the kinds of questions you should pose while talking to previous customers: Ask about the *specific* programmer who will work on your job. Is he or she an old hand, or a new recruit who will learn on your time? And ask questions about the firm's experience in your industry and with the applications you need. If the programmers have worked on these tasks before, they will have the main logic already detailed. By going through a checklist of questions they can determine your specific needs and insert them into their "skeleton" programs. Specialists cost less in the long run because they do better work.

Now turn your attention to the company itself. Check its financial solvency and the length of time it has been around. Satisfy yourself that there is a corporate entity that will stand behind the work. If you hire a freelancer who works alone, you'll be wise to take steps to ensure that he or she will be around in six months when you need maintenance or changes.

Some users seem embarrassed to ask for references, or to call them once they get the names. Yet you'll be much more embarrassed if a disreputable programmer walks off with thousands of dollars of your hard-earned money. When seen in this light, an hour or two on the phone is a small price to pay for peace of mind.

So get tough. Don't be ashamed to ask some pointed questions before parting with your hard-earned cash. Learn to check references the right way *before* you pull out your wallet to pay for a contract programmer. It's a simple skill that every small computer owner should master.

Chapter Eight

Increasing Programmer Productivity

How To Get The Most Out Of Expensive Employees



The previous chapter gave suggestions on managing a programming project. Small computer users who use outside consultants won't need to get intimately involved in the intricacies of programming. But those with one or more in-house programmers must go a step further. They must learn how to boost the productivity of those expensive employees.

A small computer installation needs the same functions performed as a large one. A big DP department has specialists to handle each job. But in a small outfit, the same person may wear several different hats. Often a single individual acts as system analyst, project leader and programmer. These multiple roles make life hectic.

Moreover, programming problems are magnified for a small organization. A large firm can tolerate a system that fails; a small company often cannot. Yet small installations are usually overseen by someone without technical skills. That person may be too intimidated by the computer to really take the reins. And the "management philosophy" is usually to leave the programmers alone and hope for the best.

That's a poor way to exploit a precious resource. You can boost productivity in a small shop. Your constant goal must be to "amplify" the efforts of your programmers. This chapter will introduce you to several helpful ideas: reusable code, structured programming, programming aids and applications generators. It will conclude with suggestions on motivating programmers to further boost productivity.

Our discussion of these topics will not be technical in nature; those who want more information should consult other books and seminars for additional help. Our goal here is simply to remove some of the mystique so you will feel more comfortable working with your technical staff and judging its work.

These techniques can't replace the type of day-to-day project management discussed in the previous chapter. Programmers have a tendency to start before knowing what the problem is all about, resulting in unnecessary lines of code, expensive revisions and time-consuming rewrites. Clearly, one of the best ways for a small DP shop to improve productivity is through good project management.

We also suggest starting with packaged software if possible. Don't let your programmers reinvent the wheel. Carefully selected packages produce faster results, even if they have to be modified. At the very least, you will get a better idea of what you want in your custom programs. Starting with packaged programs is far more productive than starting from scratch.

More advice: Most small computer users should not hire in-house programmers unless they absolutely can't do without them. In general, we believe you should not put programmers on staff unless you are big enough to justify three or more. Even then, it is a risk. Few owners are qualified to evaluate prospects and hire a good person. And programmers tend to leave soon after they arrive, because of the tremendous demand for data processing personnel.

Still, the time may come when an in-house staff makes sense. This is most likely if your company's needs constantly change. Banking, pharmaceutical, accounting, securities and wholesale distribution are fields where competition and/or

government regulation require frequent changes and, therefore, constant program maintenance. In such cases, you should give serious thought to in-house programmers.

The Old-Fashioned Way

To understand how to boost programmer productivity, we should first review the “old-fashioned” way of programming. Any program is a series of commands telling the computer what to do. Until recently, most software was created by programmers who wrote hundreds . . . sometimes thousands . . . of lines of exact instructions using special languages. Those languages include mnemonics, numbers, initials and symbols that are meaningless to the average person.

It’s a painstaking process. Although the special computer languages like COBOL and BASIC have improved slightly over the years, the cumbersome process of programming has remained essentially the same since the introduction of computers. The process has been compared to writing a big book with absolutely no errors. One typo or one wrong character can have disastrous consequences.

The time-consuming nature of standard programming has led manufacturers and programmers to develop tools that speed the process. Four of these are outlined below.

Reusable Code

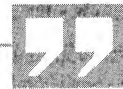
Many small DP shops write what amounts to the same program over and over again. The solution is to write it once in reusable form. It’s not an earth-shaking idea, but it works. *In a nutshell:* Don’t solve any problem twice. Save programs, or pieces of programs, that can be used again in future efforts.

Reusable code often leads to modular programs. This system uses interrelated units that can be linked together. Each module performs a single function (e.g.,

accept input data) or a few related functions (e.g., all computations). With the functions separated, each module can be coded and tested separately. When the modules are finished, they are integrated into a program.



Don't solve any problem twice. Save programs, or pieces of programs, that can be used again.



Modular programming can bring significant improvements in program quality and ease of maintenance. Ideally, the modules become part of a “library” for constructing future software. Because you reuse the same modules, procedures and formats become consistent from program to program, making them easier to use.

Structured Programming

Structured programming is a set of conventions and rules designed to bring about faster, better software. Although the technical details are beyond the scope of this chapter, small computer users should know about the method so they can consider it for use. Without elaborating, here are a few of the techniques that make up the structured approach. Those who want more details can find many books, seminars and university courses devoted to this topic.

- Using a uniform design with certain things in a certain place in every program (Structured programs are methodically ordered)
- Preparing a flowchart (a diagram of the program) before beginning to code
- Limiting the length of subroutines
- Abolishing or limiting GOTO statements (program branches)
- Reviewing all programs for conformity to the guidelines

If you can convince your programmers to follow the rules of structured programming, their programs will be easier to write, easier to debug, easier to document and—perhaps most important of all in the small shop—easier to maintain in the future. Structured programs have a design simplicity that makes them simpler to understand and modify. If a program has been properly structured, a different programmer should be able to read it with ease.

Structured programming is usually associated with large DP departments, where it has been shown to bring big gains in productivity. But small shops can use it, too, if management encourages the staff to get the necessary training. To get the full benefit, everyone must adopt the method. That means a group commitment to a new way of doing things and to a standardized design approach. Such a commitment will need management support to get off the ground.

Programming Aids

Programming aids are another example of “amplifying” the efforts of your staff. They can enable your staff to achieve faster and more reliable results.

In one sense, anything that makes programming easier is a programming aid. We use the term to mean advanced software development tools—computer programs that make it easier to perform some aspect of creating software. They make it easier to construct files; or to build screens; or find and correct errors. Some aids upgrade the capabilities of the programming language in use.

Without going into technical details, here are examples of the programming aids now on the market:

- **Screen generators** make it quick and simple to design input and output formats that can then be linked to programs or data bases.
- **Macro facilities** build commands out of other commands to tailor a conventional assembler to your application.
- **Language enhancements and extensions** make programming languages like COBOL and BASIC easier to use and capable of more complex applications.
- **Sort routines** are precoded machine-language “modules” that can be integrated into a program to speed search time.
- **File-building utilities** make it easier to create the files that store information for the application at hand.
- **Debuggers** simplify and correct errors.

Although a non-technical manager need not understand the inner workings of programming aids, he or she should be aware of their existence and encourage programmers to make use of them. The price of the aids is generally repaid quickly through increased productivity. Most experienced programmers will already have a “bag of tricks” that they have acquired over the years, but newcomers may have to be prodded to keep their eyes open for new tools that can save their time . . . and your money.

Applications Generators

In theory, an applications generator is the ultimate programming aid. It automates the entire coding process rather than just one task. In its most complex form, an applications generator (abbreviated AG) asks simple English questions about your needs, then translates the answers into code. It “generates” a program.

Repetitive tasks, such as input/output processing and routine housekeeping are handled automatically, without programmer intervention.

Despite the ads, AG's are not yet perfected so that an untrained person can use them. A non-technical user might create simple programs without difficulty, but would likely need some programming know-how to use an AG to build a complex application. But when used by experienced programmers, AG's can vastly reduce the time needed to get a program up and running. The skills of your programmers are concentrated on the unique aspects of each application rather than on the in's and out's of repetitive coding.



When used by experienced programmers, applications generators can vastly reduce the time needed to get a program up and running.



AG's come in several basic "flavors." Once you understand what each type provides, you can evaluate its usefulness to you.

Perhaps the simplest form of AG is the query language. This is an on-line program that will answer English-like questions. It allows a user to ask the computer for information without knowing any specific codes or asking the DP department to develop a new program. Query languages are useful for looking at data and getting immediate answers to questions. You could, for example, ask for year-to-date sales commissions by region and get your answer right away.

You could not, however, get a formatted report from a query language. For such a report, you might turn to a report writer (also called a report generator). With a report writer's simple, English-like language you can read existing files and put them into any format you want. Many versions also allow you to perform some arithmetic (i.e., total columns, multiply to get the tax, etc.) The distinction between query languages and report writers is starting to blur; some packages incorporate both so that users can get immediate answers to on-line queries *and* formatted reports.

Data base management systems (abbreviated DBMS) are the next step up. Many of them incorporate query languages and/or report writers. A data base is a collection of information which can be used by more than one program. It is designed to minimize redundancy. For example, a customer name may be stored only once, even though it is used for many different applications. A data base is independent of the programs which use it.

Most DBMS's can do more complex tasks than report writers. They can generate reports from the information in their system, but they can also create and update files. In other words, report writers can only read. Data base management systems can read and write. A DBMS boosts productivity because programmers don't need to concern themselves with where or how data gets stored.

Some products that call themselves data base management systems are simple file management routines that are suitable for personal record keeping and similar applications. Other DBMS's are legitimate tools designed for professionals. Choose with care.

A DBMS is probably the most useful software package a small business can buy, provided that business has someone on staff with enough technical know-how to (1) pick the right one and (2) put its power and complexity to work. Data base management is such a good way to make a small computer act more like a big one that we have given it further discussion in Chapter Ten.

The fourth type of AG, the program generator, can access more than one data

base. These systems actually create programs, lines of code that can run on the computer like any other program. Most of them do it using a “fill-in-the-blanks” technique. The programmer is led through the steps of a program. Whenever the computer doesn’t understand what’s wanted, it asks a question.

For instance, a program generator allows you to design the input forms, files and report formats right on the screen. It might ask you questions: How many records in this file? How big should this box be? What does it equal? Your answers define and design the program. The result: error-free code tailored to your exact specifications.

Program generators, however, still can’t handle the more complex applications. Nevertheless, they do allow the user to “add on” individualized code lines to handle complicated data manipulation. At this stage in their development, the beauty of program generators is that they do much of the “busywork.” Programmers can devote their efforts to the hard parts.

All of the above examples fall under the general heading of “applications generators,” but they are not interchangeable. If your desired application is simply to ask questions about the information in a program, a query language may be what you need. If you want to be able to design your own reports from that program, you need a report writer. If you want your records in a data base so they can be used by other programs, you want a data base management system. And if you want the maximum freedom to create new applications, you need a program generator.

Selected Program Generators For Small Computers

AIMS 3
Aims Plus
P.O. Box 17247
Austin, TX 78760
(512) 385-0702

GBS
Quality Software
6660 Reseda Blvd., Suite 105
Reseda, CA 91335
(213) 344-6599

GENESIS
Time Management Software
P.O. Box 727
Cushing, OK 74023
(800) 824-7888

THE LAST ONE
Known Computing
P.O. Box 66763
Scotts Valley, CA 95066
(408) 335-3133

PEARL
Relational Systems International
P.O. Box 12892
Salem, OR 97309
(503) 363-8929

THE PROGRAM WRITER/REPORTER
Vanloves
7899 Mastin Dr.
Overland Park, KS 66204
(800) 255-5119

QUIC-N-EASY
Standard Microsystems, Inc.
136 Granite Hill Court
Langhorne, PA 19047
(215) 968-0689

QUIKPRO
ICR FutureSoft
P.O. Box 1446
Orange Park, FL 32073
(904) 269-1918

SMART
Cincinnati Data Systems
4250 Creek Road
Cincinnati, OH 45241
(513) 891-6647

Selected Database Management Systems For Small Computers

CONDOR
Condor Computer Corp.
P.O. Box 8318
Ann Arbor, MI 48107
(313) 769-3988

DATA ACE
Aregon Systems, Inc.
1911 Wright Circle
Anaheim, CA 92806
(714) 634-9012

dBASE II
Ashton-Tate
3600 Wilshire Blvd., Ste. 1510
Los Angeles, CA 90010
(213) 666-4409

DB MASTER
Stoneware
1930 Fourth Street
San Rafael, CA 94901
(415) 454-6500

FMS-80
Systems Plus
1120 San Antonio Road
Palo Alto, CA 94303
(415) 969-7047

MAXI MICRO MANAGER
Adventure International
Box 3435
Longwood, FL 32750
(305) 862-6917

MDBS
Micro Data Base Systems, Inc.
P.O. Box 248
Lafayette, IN 47902
(317) 742-7388

PROFILE II PLUS
Radio Shack
Fort Worth, TX



Motivating programmers starts with good wages, but there's much more.



The People Side Of Programmer Productivity

The productivity-boosting techniques outlined above are worthless unless the employees who use them are properly managed. No matter how many programming aids you buy, you'll never get big gains without motivated people.

How do you get motivated people? Answer: By paying attention to the people side of programmer productivity. Small computer owners often have a tough time managing programmers. They usually lack the training to fully understand their computer. And, sadly, they sometimes fail to understand their people. They seem to think that a good salary is enough to motivate employees.

Motivating programmers starts with good wages, but there's much more. After basic needs—money, safety, job security—are met, management must also concern itself with higher level needs: self-esteem, responsibility, challenge, recognition, advancement and so on. Words like these are not just the ramblings of behavioral psychologists. They can be important keys to programmer productivity.

How can you apply these ideas to your small computer installation? In brief, you

must increase job satisfaction. When workers become excited and challenged by their jobs, their output jumps. Here are some common-sense methods that have worked for other computer users.

Give programmers constant feedback. All other motivational techniques depend on this one. Without feedback, employees feel unappreciated. They don't understand what is wanted from them, or how it fits into the big picture.

Periodic performance reviews are the obvious time for feedback. Management should think of reviews as opportunities to motivate employees. Your programming staff needs these periodic evaluations to judge their own progress, to boost their self-esteem and to fulfill their need for achievement.

Criticism has its place in performance reviews, but the overall tone must be positive. High achievers should be recognized and rewarded. In their quest for impartiality, some managers give the impression of treating non-performers the same as high achievers. Nothing is more deflating than to see non-performers getting an unfair portion of the pie. To keep your best employees motivated, let them know that their performance has been noticed and taken into account.

Feedback is also vital in between performance reviews. Don't neglect it. Managers who have trouble talking informally to employees should schedule regular meetings. The purpose of these "chats" is to deliver feedback and reinforce motivation.

Tell programmers what they are working on. Assign programmers to work on "deliverables." Let each individual have an identifiable piece of work with a goal, a deadline and a set of standards to judge the final product. Employees need a target at which to aim. A clear objective satisfies the needs for responsibility and self-actualization.

Tell programmers why their tasks are important. Emphasize the significance of each job you assign. Who will use the results? How? When? How does it fit into the "big picture?" Why is it important to the company? To the

programmer's career? Workers quickly become discouraged if they feel their jobs are meaningless. Repeat your comments before, during and after each project.

Let programmers work on their own. Although you can't leave junior-grade programmers unsupervised, you should give experienced employees autonomy. How much freedom to give will be a judgement call, but try to increase autonomy in regular stages. Progressively relax controls while holding employees strictly accountable for results. Allow your people to assume leadership roles. This strategy helps satisfy the needs for growth, achievement and recognition.

Let programmers improve their skills. Technical employees typically have a high need to learn and improve their skills. Assign jobs that will challenge them. Obviously, you must carefully monitor your employees to make sure you have not overextended anyone. A programmer who fails to complete a task will not be motivated.

Encourage outside classes. If at all possible, map out an upward career path within the company. Without such a career path, high achievers may feel they have to leave the company to improve their skills and their jobs.

The Good News And The Bad News

Most readers already know the bad news about programmers: they are in such short supply that you have to pay enormously high salaries to bring one in-house. But the good news is that you can dramatically improve the productivity of those expensive employees. Small shops that currently rely on the "old-fashioned" way of coding software can double or triple productivity using the techniques described here.

If you have taken the big step of hiring in-house programmers, don't let your lack of technical training prevent you from being an effective manager. Anything that can double or triple productivity should be actively considered by every small computer owner with programmers on staff. Investigate productivity aids, discuss

them with your employees, and encourage their use whenever possible.

And as you search for low-cost methods to boost programmer productivity, don't forget the people side of the equation. Proper management and motivation are probably the least expensive ways to improve output. Combined with the programming techniques suggested earlier, they can dramatically increase the benefits you receive from your expensive programmers.

IDEAS YOU CAN USE

Improving Programmer Productivity

- If your staff expands past three programmers, take a clue from large data processing departments and implement programming teams. The lead programmer will take responsibility for designing the system and laying out the framework. The entire team will then work on the actual coding under his or her direction.

One key to the successful use of programming teams is to provide clerical support. Try to off-load such tasks as filing the listings and data entry to a clerk to keep the programmers' time free for creative work.

- Some programmers have been trained to work in the "batch" mode, writing many lines of code before testing it on the computer. It is indeed important for programmers to design at their desks, but once coding begins most experts believe that on-line program development is faster. In the on-line mode, programmers spend most of their time in front of a CRT screen, using program development tools to test ideas immediately. By interacting with the computer along the way, they avoid wasting time on approaches that later turn out to be dead-ends.
- The accompanying chapter gave a taste of the productivity tools available to small computer users. Those who want more detailed information should consider consulting some of these well-known books:

Application Development Without Programmers
James Martin, Savant Institute, Carnforth, UK

Developing Structured Systems
Brian Dickinson, Yourdon Press, New York, 1981

Managing The System Development Process

Biggs, Birks and Atkins, Prentice-Hall, Englewood Cliffs, NJ, 1980

Structured Analysis And Systems Specification

Tom DeMarco, Yourdon Press, New York, 1978

Structured Design

Yourdon and Constantine, Yourdon Press, New York, 1978

Structured Systems Analysis: Tools and Techniques

Gane and Sarson, Prentice-Hall, Englewood Cliffs, NJ 1979

Structured Systems Development

Kenneth Orr, Yourdon Press, New York, 1977

- There's no better way to improve programmer productivity than to use software packages whenever possible. Here are the names of some software directories:

**International Directory of Software
CUYB Publications, Inc.**

First Federal Bldg. Ste. 401
Pottstown, PA 19464

**International Microcomputer
Software Directory
Imprint Software**

420 South Howes
Fort Collins, CO 80521

**The Official Software Buyer's Guide
Data Source Enterprises**

84 Glen Carren Circle
Sparks, NV 89431

Skarbeks Software Directory

11990 Dorsett Road
Maryland Heights, MO 63043

The Software Trader

423 Bedford Road
Schenectady, NY 12308

**Software Vendor Directory
Micro-Serve, Inc.**

P.O. Box 482
Nyack, NY 10960

Universal Software Directory

P.O. Box 5549, Dept. 3210
San Mateo, CA 94402

**Vanlove's Software Directory
Vital Information Co.**

350 Union Station
Kansas City, MO 64103

**The Book of Apple Software
The Book Co.**

6720 Hawthorne Blvd.
Lawndale, CA 90260

**BWI Software Library (Burroughs)
BWI**

7600 Chevy Chase II, Ste. 301
Austin, TX 78752

Data Sources

P.O. Box 5845
Cherry Hill, NJ 08034

**Directory of CP/M Compatible Software
Digital Research**

Box 579
Pacific Grove, CA 93950

**Directory of Microcomputer Software
Datapro**

1805 Underwood Blvd.
Delran, NJ 08075

**80 Software Directory
Computermat**

P.O. Box 1664
Lake Havasu City, AZ 86403

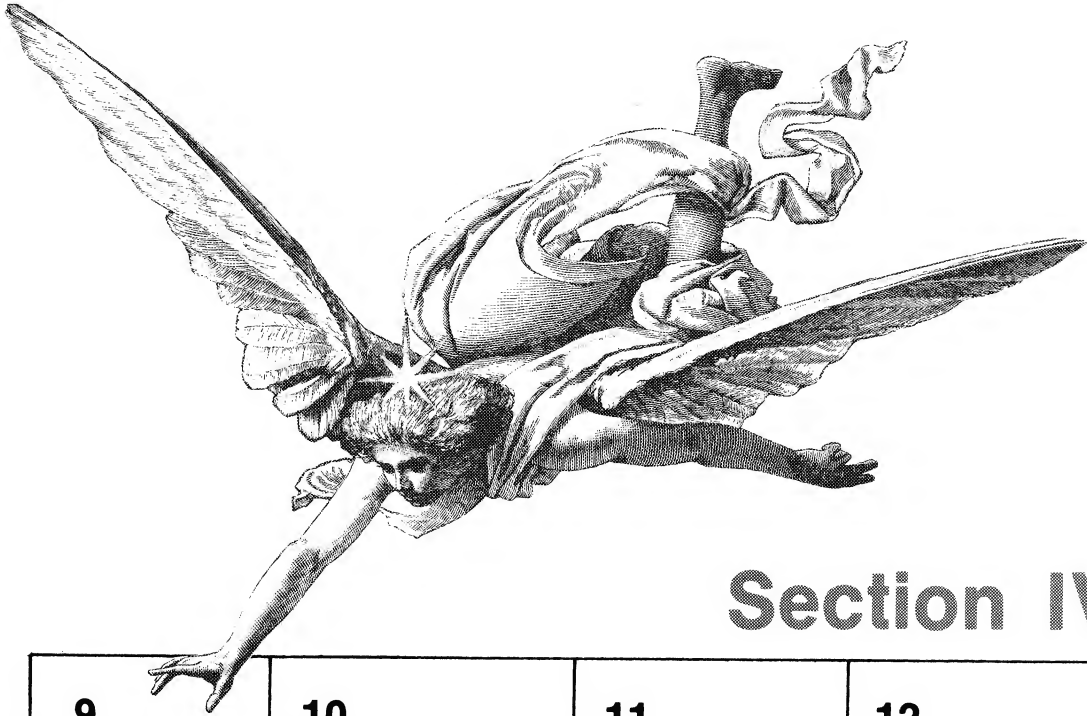
ICP Directory**International Computer Programs, Inc.**

P.O. Box 40946
9000 Keystone Crossing
Indianapolis, IN 46240

**Index to CP/M Software
Small Systems Group**

Santa Monica, CA 90405

Soar to new heights in getting the most out of your computer investment . . .



Section IV:

| | | | |
|--|--|--|---|
| 9 Upgrading Your Small Computer | 10 Making Your Small Computer Act More Like A Big One | 11 Telecom- munications For Small Computers | 12 Unearthing Additional Income From Your Small Computer |
|--|--|--|---|

**How To Get
More Out Of
Your Small
Computer**

Section IV is for you if you are reasonably satisfied with the job your small computer is doing. If you are now searching for ways to get more bang for your computer buck, these chapters will show how other small computer users have pulled it off.

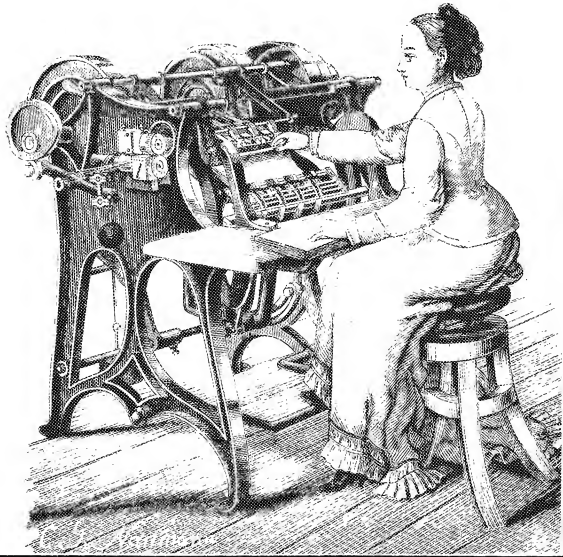
Chapter Nine, **Upgrading Your Small Computer**, will tell you when to upgrade your equipment and when *not* to. Chapter Ten, **Making Your Small Computer Act More Like A Big One**, Chapter Eleven, **Telecommunications For Small Computers**, and Chapter Twelve, **Unearthing Additional Income From Your Small Computer**, explain how owners are cashing in on their small computers. You may be surprised to learn how many big jobs you can tackle with a small computer.

Section IV in other words, is for you if you want to get everything possible out of your equipment.

Chapter Nine

Upgrading Your Small Computer

*How To Know When
The Time Is Right*



Like many small computer users, you may have originally purchased your machine to handle one job—accounting, for instance, or inventory control. But after this application is running successfully, you soon begin to see other ways to put your computer to use.

As you add more applications, you will eventually approach the upper limits of your machine. How long will the original equipment last? It should keep running for five years or more, but if you are like most users, you will probably be considering a larger system within two years.

Even before you reach the computer's upper limits, you may notice its performance begin to deteriorate. For example, response time will begin to slow down as more users begin using the system simultaneously. Over time, the productivity of your system will drop. Eventually, your new system will need upgrading, or even replacement.

Yet all too often, small computer users don't think about upgrading until a crisis

has developed. What's more, they usually don't know what steps to take when they have outgrown their initial system. This chapter will explain when and how to upgrade. We recommend two key strategies: (1) in-house benchmarking so you know when to upgrade and (2) careful consideration of your alternatives so you find the least expensive path.

When Should You Upgrade?

Let's start with when *not* to upgrade. Improving your computer system should happen when you are ready for it and you see that it can make you more money. You should *not* let yourself get so far behind that upgrading becomes an emergency and a sudden necessity. Many users install their small computer, train the operator and then ignore the machine. If you don't monitor the day-to-day operations, problems can sneak up on you. Molehills can turn into mountains through neglect:

- You unexpectedly run out of memory and your operations come to a halt while you scramble to upgrade the capacity
- A program that worked fine with small files suddenly develops serious bugs as volume increases
- Simple utilities like backup take hours instead of minutes
- Your staff must work overtime constantly to keep up with the workload
- You have to schedule a second shift to get everything done

To avoid such problems, you must measure and budget your computer like any other part of your business. You must treat the machine as if it were an employee by checking regularly to see that it is performing up-to-par. We call this checking "in-house benchmarking."

Periodic in-house benchmarking can help you pinpoint bottlenecks that are clogging the system. Likewise, it can help you predict when you will need to

upgrade so you have ample time to prepare. To project future needs, you must have an accurate idea of your present requirements. In-house benchmarking will help you do this. It is a vital—but usually overlooked—part of managing a small computer system. The most important part of small computer planning is making sure you have the resources available when needed.

By keeping an eye on your computer's capacity and performance, you can upgrade in a planned, phased manner. You can postpone the inevitable as long as possible. When you can no longer delay upgrading, you will do so quickly after taking the time to do the necessary research and using the least-expensive approach.

One Way To Benchmark A Small System

Large computer departments periodically run complex benchmarks that test the time it takes to accomplish certain tasks. A small computer installation, however, doesn't need to go to the trouble to design special tests. All that's needed is a written record of important jobs and how long they take to run, plus a periodic look at the storage capacity of your system.

One simple way to keep tabs on computer performance is with a daily use log. This log shows what jobs are on the system, when each one started and ended, and how much was accomplished (how many invoices were processed, for example). Mainframe computer installations use such a log every day. For your small computer, you can probably get by using it for a week once every two or three months. You'll find benchmarking worksheets—a log sheet and summary sheets—at the end of this chapter.

The log sheet at the end of the chapter is designed to be used by your computer operators each day for a week. They record the work as it takes place. The whole thing shouldn't take them more than 30 minutes a day. We suggest that you use the log during your busiest week. For most firms, that is the last week of the month.

Using the log sheet as a starting point, you or an employee can fill in the summaries. These documents let you see the overall picture at a glance. By comparing your current summary to previous periods, you can spot potential trouble. You will find it easier to project future needs based on this documented historical perspective. Peak loads, seasonal patterns and long-term trends will stand out clearly.

You will find additional instructions printed with the benchmarking worksheets. What type of problems do small computer users find when they perform such in-house benchmarks? In most cases, problems can be divided into two areas: (1) bottlenecks and (2) volume that has grown past the limits of the machine.



One way to postpone the need to buy a new system is to keep current equipment at peak efficiency.



Getting The Most From Your Current System

Sometimes users believe they need to buy a larger computer system when the real problem is a bottleneck that prevents the current computer from running at full capacity. A system is only as powerful as its weakest link. One way to

postpone the need to buy a new system is to keep current equipment at peak efficiency. That means in-house benchmarking to search out and solve bottlenecks.

The philosophy of “stick with your old machine as long as possible” is unpopular with some vendors. They want you to think that their latest model is the only way to fly. But the introduction of a faster, shinier computer is no reason to throw away your old one if it is still doing the job. There’s no disgrace in using last year’s model . . . and there may be some profit in it if you can avoid the time and hassles for converting to a new system.

Here are suggestions on getting around two of the most common restraints: operating bottlenecks and equipment bottlenecks.

Operating Bottlenecks

To extend the life of your present system, look for ways to get more done without spending a lot of money. Perhaps you are trying to accomplish too many tasks with a single small computer. You may need to eliminate some of the work, or extend the operating schedule. One common difficulty has been dubbed “creeping reportitis.” Over time, users add more and more reports, printouts, listings, and audit trails until the system is clogged by paperwork. Each new report seems worthwhile and justified at the time, but the net effect is to drown the computer in a sea of paper.

Be careful before adding new reports and applications to your machine. Does it really justify the software expense? The personnel time? The added strain on the system? And each time you benchmark your system, give your reports careful scrutiny. The summary sheet at the end of the chapter has a space for you to consider each report. Could you eliminate it? Run it less often? Combine it with another report? One way to learn if a report is really necessary is to stop sending it out. If no one complains, you may have a superfluous report that can be eliminated.

If you can't pare away any of the work, and occasional overtime isn't enough to help, you may want to "off-load" some of the work. Perhaps word processing, for instance, would be better done on its own standalone machine. Or maybe you should give your twice-a-month payroll processing to an outside service bureau. Before you decide to upgrade the equipment, determine if a few such common-sense changes could solve the problem for less money.

Equipment Bottlenecks

Some small computers are slowed by a weak link in their equipment chain. Usually it is the printer or the disk drives.

If you have an inadequate printer, one solution is to buy a faster, more expensive printer. A cheaper way out may be to arrange for "print spooling." Spooling is the data processing term for allowing the computer to work on one job at the same time the printer is printing out a second job.

Under the standard set-up, the computer transmits a line or two to the printer, then waits for it to catch up. When the printer is ready for more, the computer sends it and waits again. Meanwhile, your computer can't be used for anything else. It's not unusual for a printer to stand idle for hours while data is being entered or manipulated. Then, when printing starts, the computer may be idle while waiting for the printing to finish.

With spooling, the computer sends all the data to the printer at one time. The data is stored in a "buffer" where the printer can use it at its own speed. Once the data has been transmitted, the computer can go on to another job. Spooling often eliminates the printer bottleneck, since your operators can be busy at something else while the printer chugs along.

You can add spooling in several ways. Some companies make hardware devices for insertion between the computer and the printer. These intelligent devices take over the job of storing characters for the printer.

In some cases, you can obtain spooling capability by modifying or upgrading your operating system. And, occasionally, you can obtain spooling for specific applications by switching to a different program. Some word processing packages, for instance, have built-in print spooling. Changing to such a package could boost productivity if you do a large amount of word processing.



Before putting your money down for a hard disk drive, find out what changes must be made in your operating system.



Switching To Hard Disk

Some floppy disk-based small computers are “disk bound”—their floppy disks cannot keep up with the rest of the system or they cannot store enough data. If mass storage is the limiting factor, you have two choices short of switching to an entirely new system: adding additional floppy drives or switching to a hard disk.

Many small computer owners have switched to hard disk over the past few years. The industry press has been touting hard disk drives for several years. Still, they are not a panacea for every small computer owner. In some cases, an additional floppy drive will be perfectly adequate.

Usually, however, adding a hard disk drive is a better choice. Floppy disks have

too many disadvantages. First is inconvenience. Using a multi-drive floppy system requires constant switching and shuffling of disks. Labeling procedures must be scrupulously maintained. Since mixups and faulty floppy disks are common, adequate backup is crucial.

Adding additional floppy disk drives will slow the performance of the system as a whole. And floppies limit your future choices. Because they do not offer as much storage, you are likely to run out of room again. And if you wish to expand into multi-user networks, as described in the following chapter, floppies just won't make the grade.

On the other hand, if you don't expect to need more than 5 megabytes (5 million characters) of mass storage within the next three years, and if you don't plan to add multiple terminals, you might be wise to stay with floppy disks. If your storage needs are, or will be, higher than 5 megabytes, or if you will have multiple users, you should seriously consider a hard disk.

In most cases, a hard disk drive is a better buy than another floppy drive. Still, you should carefully study the costs versus the benefits before buying a hard disk. You should understand how the technology works, the advantages it can offer and the problems it can cause.

Hard Disk Technology

Most hard disks for small computers now use *Winchester* technology. Although you can find other types—notably with removable “platters,” “cartridges” or “disk packs”—Winchester drives are generally conceded to offer higher reliability and lower prices.

Winchester disks are sealed, so dirt and dust can't contaminate the disk. The actual disk looks like a phonograph record covered with a magnetic coating like that on audio recording tape. Information is “written” and “read” magnetically

through a read/write head. The surface is hard, so it is less likely to warp or wobble. And since the disk cannot be removed, there is little chance of outside damage. This allows the read/write head to “fly” faster and closer to the surface—many times closer than the thickness of a human hair.

Winchesters come in three standard sizes: 14, 8 or 5¼ inches. Most small systems use the less expensive 8 and 5¼ inch sizes.

The Advantages Of Hard Disk Drives . . .

Hard disk drives dramatically increase the storage capacity of a small computer system. They have five to sixty times the capacity of a floppy drive while taking the same space. And they do it at a lower cost per unit of storage than standard floppy disks. When you look at cost over the long run, hard disks look even better. They have a longer life, usually estimated at about five years. Floppy disks, on the other hand, must be replaced every 6 to 12 months.

Switching to hard disk will immediately result in more convenience for operators. All information is accessible simultaneously, without switching or trading disks. Although you can theoretically hold vast amounts of data on a floppy system, it would be spread between 20 or more separate diskettes. The information would be difficult to manipulate. Lost and mixed up diskettes would be a certainty.

Hard disk drives do not get mixed up or lost, so it is easier for you to access and manipulate data. Hard disks do not get dirty or bent, so that data is more reliable. And hard disks are typically two to six times as fast as floppies, so your jobs get done quicker. And hard disk drives make it possible for your small computer to “grow up” in the ways suggested in the following chapter. As you expand into such things as multi-terminal applications and real-time processing you need the large on-line storage of a hard disk.

. . . And The Drawbacks

Hard disk drives have drawbacks, too. For many executives or managers who use the small computer in their offices, it is **noise**. The drives make too much noise to talk comfortably on a nearby telephone. Another obvious disadvantage is the higher initial cost. Although Winchester drives are dropping in price, their initial cost is still substantially higher than that of floppy drives. To the price of the disk drive itself, you must add other costs before you can make an accurate cost/benefit analysis. For example:

- Controller hardware and connecting cables
- Interface software and/or modifications to the existing operating system
- New equipment and/or software for backing up the hard disk
- Modifications to existing applications programs
- New applications programs if existing ones can't be modified
- Transferring information from floppies to hard disk (special programs and/or clerical expense)
- Downtime during installation and debugging
- Retraining operators

Your existing operating system will not “understand” how to use all the space on the hard disk. You will have to have it modified or buy a new operating system. Although many hard disk operating systems claim to be 100% compatible with previous programs, that boast is rarely true. Usually the switch to a hard disk and a new operating system causes problems with existing applications programs, which must then be “repaired.”

Although hard disk drives are much more reliable than floppies, you will still need backup. No matter how reliable, your hard disk cannot protect you against operator error. Moreover, hard disk drives *do* fail more frequently than most vendors will admit. Since few companies have more than one hard disk, when it goes down, the whole system goes down. It typically takes more than one day to

repair a hard disk. In short, it's a great deal more trouble when a hard disk drive breaks down than when a floppy drive fails. Most hard disk users will already have a floppy disk built-in, which can provide backup protection at little or no extra cost. Floppy disks provide enough capacity to back up most users' day-to-day transactions. Most installations do not need to copy their entire store of information each day. Rather, they need to capture the data relevant to that day's transactions. Some operating systems already provide this capability. Files are automatically flagged as they are updated. At the end of the day, a utility automatically copies the file changes onto the backup disk.

But floppies are an expensive and time-consuming way to back up an entire hard disk. There is a point at which loading and unloading floppies becomes cumbersome and impractical. Legal, insurance, banking and other installations where data protection is critical may require total backup each day.

When the complete contents of the hard disk must be copied, tape drives may be a good option. Just any tape drive will not do, however. Non-intelligent tape backups are simply data "dumps." You dump everything onto the tape. If you lose data, you must dump everything back onto the hard disk—you cannot pull a single file from the tape. Most users should give preference to intelligent tape subsystems which come with a specially designed software interface. These offer speed and reliability, but also let the user search through the tape to restore individual files and programs.

Some companies also use videocassettes as a backup medium. They have the advantage of being inexpensive yet capable of storing a large amount of data. As with tape drives, users should look for an "intelligent" system.

Things To Check Before You Buy

Before putting your money down for a hard disk drive, find out what changes must be made to your operating system and applications programs to make the switch. If you are lucky, you may need a new operating system and a few minor

modifications. If you are not as fortunate, you may need substantial revisions, or you may be forced to start over with new programs. Such software problems could double the actual cost of a hard disk.



Multi-user systems often become disk-bound—the disk cannot keep up with the simultaneous requests for information.



When shopping for hard disk drives, the next thing to consider is the capacity. Hard disks are expensive, so you don't want to buy too much. On the other hand, if you underbuy, you'll run out of headroom in a year or so. Generally, it is wise to project your growth for the next two years to determine how much storage you need, then add at least 50% to that figure. Once you have the extra storage available, you will quickly find ways to fill it up.

Your next consideration should be the type of application. Do you plan to keep your small computer on a single-user basis? If so, you will probably not need more than 10 megabytes or so. Nor will you need terrific speed, since your system only has to keep up with a single operator. You should probably be looking at low-priced 5¼ inch drives.

Do you plan to expand into multi-user applications? If so, several users will have access to a common data base. You may well need 20 megabytes or more of storage. Since several operators contend for the disk drive, multi-user systems often become disk-bound—the disk cannot keep up with the simultaneous requests

for information. You should shop for a high-end system that offers fast access time.

When shopping for hard disk drives ask the dealer or the manufacturer for the brands recommended for your system. It's much more trouble-free to use a drive specifically designed to mesh with your computer.

IDEAS YOU CAN USE

Upgrading Your Small Computer

- Don't upgrade your system at great expense if you only have a short-term need for additional equipment. Do you need more terminals and printers for a one-time project? Do you want to try out a brand before you buy? Are you short of up-front capital? Equipment rental may be your best alternative.

You can rent most types of computer equipment (and other electronic gear) on a non-binding basis. Most rental companies will also arrange leases, rent-to-purchase agreements, installment sales and mail-order sales if you prefer. You can rent for a week or for a year, but most rentals average two to four months. The one-month rate is typically 9 to 11 percent of the equipment's list price. That rate can be cut by as much as 50 percent if you commit to a longer rental period in advance.

Look in your local Yellow Pages under **Data Processing Equipment** or **Electronic Instruments** to find rental firms.

- Small computer operating systems are growing in sophistication. More and more large computer techniques are appearing on microcomputers. One such technique is the "job accounting system." This operating system software gathers and records the information needed for in-house benchmarking. In general, it provides data on actual processing hours by category of use and by program: monthly reports showing how many hours required for each major application, variance reports, percentage of utilization reports, and other helpful information.

Before investing too much time in a manual benchmarking system, find out if a job

accounting system is available for your small computer.

- One of the best ways to upgrade is to buy an identical, "redundant" computer. If you are considering this alternative, be sure to look into the used computer market. A few years ago, only larger computers had a strong resale market, but today it is possible to find almost any brand. Several national publications devote themselves to the resale market, and most major metropolitan areas have annual computer "swap meets."

If you have two computers, reliability is not quite as crucial, since you can always double up on one machine if the other one must be repaired. Under these circumstances, a used machine could be a real bargain. Some manufacturers will even provide service contracts for used equipment, provided it is checked out and brought up to par before the agreement begins.

Upgrading The Entire System

Let's review what we've seen so far about upgrading. Your first job is to monitor the equipment, so you know in advance of problems. When those problems arise, you should first try to extend the life of your current system by overcoming operating and equipment bottlenecks.

But sooner or later you will run out of ways to improve your current system. At this point you are faced with upgrading (or replacing) the entire computer. What's the best way to go about it?

In many cases, the best way to upgrade is to purchase a second, identical system. We have already discussed the advantages to this in our chapter on disaster planning. An identical system protects you in the event the first computer

breaks down. And it greatly reduces training time, since your staff is already familiar with it.

But many users can't go the "redundant" route. They may need faster processing time with more simultaneous users. For example, a legal firm with many typists may find that overall response time is too slow when everyone is accessing common files. Separate, redundant computers wouldn't help such a firm.

The Importance Of Compatibility

If you have no choice but to move to a larger computer, try to remain compatible with your current system. Many Data General computers, to name one example, can be "field-upgraded" to increase the speed and processing capability without getting a new system. Likewise, owners of "8-bit" Radio Shack Model II computers can add a board that converts the machine into a "16-bit" microcomputer. After adding the board, Model II owners can continue to use their previous software. This allows for an easy transition period. You could, for instance, remain with your familiar 8-bit word processing and payroll programs for the time being while switching to a 16-bit inventory program that had the extra speed and capacity you needed.

Even if you cannot "migrate upward" with your current computer, it may not be a bad idea to look first at machines from the same manufacturer (or from "plug-compatible" competitors). Then you can move up to a new level of computing power without discarding all the software, peripherals and procedures you used on your first computer. By this time, your investment in the original system will be substantial. Losing it would be a step backward. But if you can simply unplug your printers and disk drives from the old computer and plug them into the new one, you may save a substantial amount.

If the original manufacturer doesn't have a "migration path," you may still be

able to upgrade without throwing away all of your investment in your old system. You may be able to use your current computer as part of a larger system. Several manufacturers now have products that allow microcomputers to interface as part of a local network.

In fact, local networks are such an important topic that you should investigate this new trend thoroughly before making any decisions about buying a new machine. The following chapter covers local networks in detail.



CASE HISTORY

WHAT CAN I LEARN?

Expandable Computer System Pays Off For New York Motorcycle Dealership

Perhaps the best way to avoid computer growing pains is to purchase a system that is easily expandable. In the beginning, you purchase only as much as you need to get started; as you grow, you buy additional hardware and software.

That's the approach taken at Carl's Honda of Brooklyn, New York, a single-location firm that is one of the country's largest parts dealerships. Carl's learned the hard way about the importance of getting a system that can grow along with you. Its first computer, purchased primarily to help with the company's substantial mail order parts business, turned out to be a "\$30,000 white elephant that just sits in the corner," according to President Mark Kann.

But Kann learned from his first computer experience. The second time around he bought an expandable Microdata computer together with a top-to-bottom software package called "Wheels." The software, which automates virtually every phase of a motorcycle dealership, was developed by Comp-Ware Systems, Inc. of Plainsboro, NJ.

Both the hardware and the software come in "module" form, permitting users to

computerize one phase of their operation before expanding into new areas. For example, Carl's began about a year ago with two terminals and one printer. The dealership currently has five terminals (with two more on order) and three printers, plus a 50 megabyte Winchester hard disk drive and a tape drive for backup. The Microdata computer can theoretically handle up to 64 terminals.

Although a motorcycle dealership could get started on the "Wheel" system for as little as \$30,000 by opting for used hardware and a portion of the total software package, a typical installation, with four terminals, a 30 megabyte hard disk and the complete software would run about \$80,000. That's too much for many smaller dealerships to swallow at one time, but with the modular approach a company can expand as its growth and its finances permit.

Does the computer pay for itself? Kann thinks so: "Before getting this system," he said, "we were averaging about three turns per year in our parts business. Now we are getting four turns, and some of our fast items are turning six to seven times."

"We previously had older parts on our shelves that weren't moving," he explained. "With this system we stock only what we need. The software even takes seasonal needs into account. For instance, it wouldn't tell you to order air conditioning in the winter just because you sold a lot of it in the summer."

The "Wheels" software package comes with the manufacturer's parts numbers and descriptions already entered into the system. This saves substantial effort and time in converting from manual to computer. Carl's Honda, for instance, keeps inventory information on hand for about 90,000 individual items from Honda—90,000 items that would otherwise have had to be manually keyed into the system.

The computer will eventually store a complete 18-month sales history for each item, permitting accurate sales forecasting and inventory stocking decisions. Carl's also keeps its 5,000 mail order customers in the computer, for simplified invoicing, accounting and inventory control.

Mark Kann reports that Carl's has doubled its business without hiring additional help, thanks to the computer. "The salary saving from a single employee would practically make the payments," he said, "and I would have had to hire three more people to do the same volume of business as I am doing now."

"Best of all," he concludes, "as we continue to grow, the computer is ready to grow with us."

WORKSHEETS #11, #12 & #13

INSTRUCTIONS

HOW TO USE THE DAILY USE LOG

Photocopy the Daily Use Log on the following page and keep copies near each terminal. Ask your operator to fill it out. Repeat the procedure daily for an entire week, or as long as it takes to get an accurate picture of your computer's workload. Larger installations may want to do this each month. Smaller operations can probably get by with bi-monthly or quarterly benchmarking. Choose the busiest week of the month.

After collecting a week's logs, transfer the information to the Summary Sheet on page 193. Save the summary for comparison with future periods.

HOW TO USE THE SUMMARY SHEET

In most cases, the numbers for the Summary Sheet will come directly from the Daily Use Logs. All the figures should be averages from the entire week, unless you ran the job only once.

One figure, the percentage of total disk capacity in use, will require a simple calculation. For hard disk systems, it's a simple process: divide the amount of storage you are now using by the total capacity. Your operating system should have a simple utility to tell you how much you are currently using.

Floppy disk systems don't have everything on line at the same time, so you should make the same calculations for your largest application. If you have a system that permits you to have unlimited storage by swapping diskettes, you can replace the percentage figure with the number of diskettes in use. If that number grows past four or five (for a single application), you are probably a candidate for a hard disk drive.

Use the summary to get an overall picture of your computer's use and workload. Challenge each report—is it really necessary? Look for bottlenecks—would, let's say, a faster printer free up the system for more jobs? And keep a close eye on total capacity. When you have reached 75% of your disk capacity, it's time to start planning for expansion.

WORKSHEET #11 (a)**DAILY USE LOG**

Fill out this sheet as you use the computer throughout the day. Use a second sheet if you cannot fit an entire day's activities onto the first one.

At the beginning of the day, enter the first job processed and the time it began. When it is completed, note the ending time as well as your best estimate of the amount of time you were directly involved. (You may be involved 100 percent of the time for applications like word processing or order entry, but only 20 percent during applications that require considerable number crunching or sorting time.) Estimate the amount of time the printer was in use and write it down in the space provided.

When the job is finished, you must also enter the amount of work processed—letters typed, invoices processed, and so on. Finally, write down the names of any reports that were printed and the number of pages for each.

Repeat this process each time you use the computer for a different task. At the end of the day, fill out the Time-Line Summary on page 195. Draw an arrow in the appropriate column from the start time to the completion time. For those times the computer sat idle, draw a line in the "Unused" column.

WEEK OF: _____

TODAY'S DATE: _____

NAME OF APPLICATION: _____

TIME STARTED: _____ WORK PROCESSED: _____

TIME COMPLETED: _____

OPERATOR TIME: _____

PRINTER TIME: _____ REPORTS PRINTED/PAGES: _____

(Continued)

WORKSHEET #11 (b)

DAILY USE LOG

NAME OF APPLICATION: _____

TIME STARTED: _____

WORK PROCESSED: _____

TIME COMPLETED: _____

OPERATOR TIME: _____

PRINTER TIME: _____

REPORTS PRINTED/PAGES: _____

NAME OF APPLICATION: _____

TIME STARTED: _____

WORK PROCESSED: _____

TIME COMPLETED: _____

OPERATOR TIME: _____

PRINTER TIME: _____

REPORTS PRINTED/PAGES: _____

NAME OF APPLICATION: _____

TIME STARTED: _____

WORK PROCESSED: _____

TIME COMPLETED: _____

OPERATOR TIME: _____

PRINTER TIME: _____

REPORTS PRINTED/PAGES: _____

WORKSHEET #12 (a)**SUMMARY SHEET**

Fill out this sheet using the numbers on the Daily Use Logs. All of the figures should be averages from the entire week, unless you ran the job only once.

WEEK OF: _____

HOURS OF USE PER DAY (COMPUTER): _____

HOURS OF USE PER DAY (PRINTER): _____

BACKUP TIME PER DAY: _____

PERCENTAGE OF TOTAL DISK CAPACITY UNUSED: _____

APPLICATION #1: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

APPLICATION #2: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

(Continued)

WORKSHEET #12 (b)

SUMMARY SHEET

APPLICATION #3: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

APPLICATION #4: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

APPLICATION #5: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

APPLICATION #6: _____

Time to complete: _____

Operator time: _____

Printer time: _____

Reports (Name/Pages): _____

WORKSHEET #13 (a)**TIME-LINE SUMMARY**

At the end of the day, fill out this Time Line Summary. Draw an arrow in the appropriate column from the start to the completion time. For those times the computer sat idle, draw a line in the "Unused" column.

APPLICATION #1: _____

APPLICATION #2: _____

APPLICATION #3: _____

APPLICATION #4: _____

APPLICATION #5: _____

APPLICATION #6: _____

| | #1 | #2 | #3 | #4 | #5 | #6 | BACKUP | UNUSED |
|---------|----|----|----|----|----|----|--------|--------|
| 8 AM | | | | | | | | |
| 9 AM | | | | | | | | |
| 10 AM | | | | | | | | |
| 11 AM | | | | | | | | |
| 12 NOON | | | | | | | | |
| 1 PM | | | | | | | | |
| 2 PM | | | | | | | | |
| 3 PM | | | | | | | | |

(Continued)

WORKSHEET #13 (b)

TIME-LINE SUMMARY

| | #1 | #2 | #3 | #4 | #5 | #6 | BACKUP | UNUSED |
|-------------|----|----|----|----|----|----|--------|--------|
| 4 PM | | | | | | | | |
| 5 PM | | | | | | | | |
| 6 PM | | | | | | | | |
| 7 PM | | | | | | | | |
| 8 PM | | | | | | | | |
| 9 PM | | | | | | | | |
| 10 PM | | | | | | | | |
| 11 PM | | | | | | | | |
| 12 MIDNIGHT | | | | | | | | |
| 1 AM | | | | | | | | |
| 2 AM | | | | | | | | |
| 3 AM | | | | | | | | |
| 4 AM | | | | | | | | |
| 5 AM | | | | | | | | |
| 6 AM | | | | | | | | |
| 7 AM | | | | | | | | |



Chapter Ten

Making Your Small Computer Act More Like A Big One

*Techniques To Make A
Small Computer Grow Up*

Once your small computer is installed and debugged and the most important applications automated, how can you increase its value? This chapter will discuss three important techniques you can use to make your small computer act more like a big one. First, through **networking** for increased capability. Second, by use of **data base management systems**. And third, by using it for **decision support**—a function previously reserved for corporate users with large mainframes.

These techniques are not new. What is new is the growing number of small computer users who are taking advantage of them, thanks to their falling cost. The purpose of this chapter is to briefly acquaint you with each one so you can decide if it is worth your time to investigate further.

Technique #1—Local Networks

When small computer users want to make their small computers grow up, their first move is usually to buy more equipment: more peripherals (printers, hard disk drives) or even more identical systems. But most small computers are standalone systems limited to one user at a time. There is no way to share a common data base or expensive peripherals.

If your organization is growing, the day will eventually come when you will need to have several people checking on common information or sharing larger, more reliable disk drives and printers. As you get more pieces of computer gear, the key to productive use is to tie them together so that they can exchange information. How? With a local network.

A network is a means to hook small computers together so they can communicate, so they can share expensive resources (printers, hard disks, etc.) and so they can accomplish tasks that previously required larger computers. Your original small computer becomes part of a larger network of similar machines. A network is called **local** if the interconnected small computers are in the same or nearby buildings.

Although a few networks for educational applications are based around floppy disks, virtually all business networks include at least one hard disk, two or more small computers with at least one floppy drive each, and assorted printers. Local networks link the machines to each other with wire or cable and use special network circuits, which are boards that plug into each computer or into separate enclosures. Some small computer manufacturers make network products for their machines, but others need software and hardware which is available from independent vendors (see box).

Don't confuse local networking with multi-user single computers. In a single computer set-up, all the user terminals are "slaves" to the central processor. Because the processor is shared, response time gets slower each time you add a

terminal. Even worse, if the central processor fails, everyone loses their work and must wait until the system is repaired. A local network, on the other hand, gives each user its own computer while connecting it to all the others. Users pool individual computers into one powerful system.

And don't confuse networking with traditional time-sharing. Time-sharing users access a large computer by phone lines. Each user is limited to one bank of information in the mainframe. You don't subscribe to or rent from a local network—you own or lease it.

The Advantages Of Networking

If you currently have a single-user computer, a network may offer everything you need to perform more efficiently: communications, additional mass storage and fast access. Moreover, users can work independently of one another, or as a team.

That independence can be important when equipment malfunctions. Failure of one computer will not affect the others in the network. And if the central controller goes down, each user can disengage from the network and run independently using backup programs on floppy disk drives.

Network users can communicate directly with one another through their terminal screens. They can compose and edit messages at one station, then transmit them for storage in "mailboxes" at other selected stations. You could, for instance, send administrative messages, reports, interoffice memos, orders and other files.

By sharing a hard disk, network users have access to many times the information storage capacity of a floppy disk-based system. Because the information is stored just once, there is less chance of mistakes due to different "versions" of company data. Moreover, multiple users can access that consolidated data. With a hard-disk based local network, much more information is instantly available to the user. And a network lets you put a terminal for each application—word processing, accounting, order processing, inventory control—right where it is

needed. No more reliance on a single, inconvenient central computer.

The Disadvantages Of Local Networking

Someday most computers will be sold as modular units that can easily become part of a local network. Standards will be carefully set so different makes can work together. Today, however, the networking marketplace is chaotic and fraught with danger for unprepared shoppers.



In almost every case, unfortunately, the manufacturer has developed its own special hardware and software that is incompatible with everyone else's.



Unlike the buyer of a stereo, who can mix and match equipment from several makers, the buyer of networking equipment is usually stuck with the same manufacturer for the terminals and other add-on gear. A computer that's terrific for engineering applications may not be well-suited for word processing, yet with a single-vendor system you have no choice. You cannot be assured of getting the best machine for the job. Numerous local network products are now on the market and new entries are announced almost every week. In almost every case, unfortunately, the manufacturer has developed its own special hardware and software that is incompatible with everyone else's.

As if the hardware problems were not enough, small computer users may also

have software problems when they attempt to upgrade to a local network. Certain microcomputer programs cannot be adapted to use the storage resources of a hard disk. You may have a considerable software conversion expense. And if your network links several different types of computers, they may be able to communicate, but not be able to use each other's programs and data.

When To Consider A Network

Local networks can provide a solution to several kinds of problems:

The need for access to a common data base. A network could provide, for instance, immediate access to the inventory file for all sales clerks with immediate updating. Or immediate access to a large library of standard documents and word processing.

The expense of peripheral equipment. Two or three typists could share a single, daisy-wheel printer. A single hard disk drive could serve multiple users. If you have ten or more users, the savings on printers and disk drives could easily justify a network.

Rapid and irregular growth. Quick expansion can cause big headaches if it means you must give up your current computer system and start over again with a larger machine. A network, on the other hand, allows expansion in small pieces, without throwing away software or equipment investments. If you expect to increase your computing requirements by 50 percent each year, a local network may be a cost-effective solution.

There are a few set standards, so buyers must shop with caution to avoid getting an incompatible or obsolete product. Moreover, many local networking schemes are designed with giant corporations in mind. They are too expensive and too complex for small users. The widely publicized Ethernet standard is one example—each hookup costs an estimated \$2,000 on top of the price of the computer.

IDEAS YOU CAN USE

CHOOSING A LOCAL NETWORK

The lack of standards and proven systems makes choosing a local network a risky business. Consider these factors before making a decision:

- **Total Cost:** Factor in the cost of controllers, special boards, cables, installation and training as well as the cost of the individual computers themselves.
- **Number of Terminals:** Although some networks can link hundreds of small computers, others are limited to as few as 32. Shop for a network that can grow with you.
- **Software Compatibility:** If you have a substantial software investment, look for a networking scheme that allows you to continue using your old programs.
- **Hardware Compatibility:** Obviously, you want to use your current computer as part of the system. If you have several different brands in-house, you may want to look at one of the networks that allows different types of computers to hook up (most are restricted to one or two vendor's products).
- **Transmission Rates:** Some networks offer little improvement over telephone lines. Others are very fast. Choose a system that can keep up with your present and future needs. Here are the names of some local network vendors.

Corvus Systems
(OmniNet)
2029 O'Toole Ave.
San Jose, CA 95131

Data General Corp.
(Xodiac Network Bus)
4400 Computer Drive
Westboro, MA 01581

Datapoint Corp.
(Arcnet)
9725 Datapoint Drive
San Antonio, TX 78284

Digital Microsystems
(Hinet)
1840 Embarcadero
Oakland, CA 94606

Intertec Data Systems
(CompuStar)
2300 Broad River Road
Columbia, SC 29210

Micromation
(M/NET)
1620 Montgomery ST.
San Francisco, CA 94111

Ohio Scientific
(OS-65U Level III Net)
1333 South Chillicothe Road
Aurora, OH 44202

Wang Laboratories
(Wangnet)
One Industrial Ave.
Lowell, MA 01851

Xerox Corp.
(Ethernet)
701 S. Aviation Blvd.
El Segundo, CA 90245

Zilog
(Z-Net)
10340 Burbank Road
Cupertino, CA 95104



Data base management holds out many benefits for small computer users—but it also poses some hazards.



Technique #2—Data Base Management Systems

Most large corporations are using or seriously considering data base management. Today, some of the benefits of mainframe data base management systems are available in mini- and microcomputer versions. You should cautiously investigate this topic for its money- and time-saving potential.

If you've already got your small computer up and running with standard, file-oriented programs, your first question about data base management systems (DBMS's) may be, "Why bother?" One answer is that a DBMS can eliminate some of the problems associated with the standard approach. Currently, most programs individually store all the data needed for the problem at hand. Different programs do it in different ways, with different structures and formats, so information usually can't be shared between programs, or, at least, not without some complex additional programming.

If you need a customer's name and address for five separate applications, for

example, that name may have to be entered and stored as many as five times. Under such circumstances, the job of adding, deleting and changing information is tedious and time-consuming.

What's worse, errors tend to creep in. A small change can set off a chain reaction of other changes. All too often, an operator (or an update program) will put new information into one program, but fail to make the same change in another. Soon a company's records are at odds with one another. The accounts receivable program says the customer ordered \$500 worth of goods, the inventory programs says he ordered \$50 worth and the customer file says the customer doesn't exist.

Wouldn't it be nice if we could store all the data just once, then pull it out as needed for different programs? That, of course, is the idea behind data base management. DBMS's are an established method for large computers, but, until recently, they weren't available for smaller machines.



IDEAS YOU CAN USE

DBMS Tips

You don't need to be a data base expert to put this important technology to work in your company. In fact, you'll probably want to assign a technical expert, either a staff member or a consultant, to investigate the topic thoroughly before you make any purchase decisions. You should know enough, however, to give the orders and to ask

the right questions. Here are some basics:

- The traditional approach to information storage and retrieval separates data into units called **files**. At any given time, users have access to a limited amount of information, generally only as much as is needed to process the application at hand. If management decides it needs a report containing data from several different files, there's no way to get it without reprogramming. As companies grow, they often begin to pile on more and more files, programs and reports, until it becomes a full-time job just to keep the complex arrangement up and running.
- Data base management sets out to clear up this confusion and make it easy to get needed information. You might think of a **data base** as a "file cabinet" of information. In the traditional, file-oriented approach, each program keeps the "files" it needs for itself. In the data base approach, one central "file cabinet" serves everyone, lending out "files" to whoever needs them at the moment. Data is stored independently of the programs that use it.
- Let's use a mailing list example to illustrate the data base concept. Suppose we want to keep a list of customers. That list would probably include the customer's name, company, address, phone number, type of business, amount and status of any current orders, credit information, and so on.
- In a data base, each item of information about a customer is called a **field**. The customer's name is one field; his street address another; his zip code yet another. When we put all the information about one customer together we have a **record**. In our mailing list example, each customer will have one record, which will be made up of individual fields such as name, address and so on. All the records together make up the data base, or the **file**.
- A data base management system allows you to sort through the file in many different ways. For example, we could sort through our mailing list to find all the customers in a given zip code, or all the customers who have ordered within the last year. These are examples of sorting on a single field. We can also sort on multiple fields: all the customers west of the Mississippi who have purchased more than \$1,000 worth of Widgets within the last 6 months, for instance.
- After sorting, we will want to do something with the information. That's where a **report writer** comes in. This facility allows us to specify just how reports will be printed out. We might use it to format something as simple as mailing labels. Or we could make a more complex report. For example: A list of our customers by geographical region in alphabetical order; in one column could be the amounts of their orders; in another the amount that is past due; in other columns the subtotals

by region. The possibilities are endless. After you have created the report formats you want, a good report writer "remembers" them for future use.

- Sometimes you don't need a formal report, but you do want to ask a few quick questions. Perhaps you want to look at the account of an important customer; perhaps you want to know if sales picked up after a recent ad campaign in one region. For quick, one-time questions, you might use a **query language**. Query languages are intended to allow non-technical users to quiz the data base in simple English. Not all small computer data base management systems have this facility.
- When shopping for a DBMS, you will probably run into three types. Two of them, **hierarchical** and **network**, have been around since the 1960's. The third, **relational**, is newer. Vendors of each type will try to tell you that their type is the best. In the small computer field, however, there isn't too much difference between them. All other things being equal, relational systems seem to be the wave of the future; IBM has put its stamp of approval on this approach. Far more important than the type of system, however, is its performance in your own situation.

Now several dozen companies sell DBMS products for small computers. Should you give them serious consideration? Data base management holds out many benefits for small computer users, but it also poses some hazards. First, here are the pros:

Increased Flexibility. With a good DBMS, you can often grow and change without the penalty of redoing your applications programs. You can grow by adding new fields, new record types and new relationships between types. You can get many different views of your company's data while keeping only a single copy.

Reduced Programming Costs. Most DBMS users find they don't

need as many new programs. With a good report writer or query language, end users can get information out without needing a programmer to write the code to extract the data. When new programs are needed, they are generally easier to create. If you have in-house programmers, or if you hire contract programmers, a DBMS can boost their productivity, as explained in Chapter Eight.

Increased Value Of Company Data. Right now your company's information is probably "buried" in various programs. A DBMS with a good report writer would make the information available to anyone who needed it: your sales manager, your warehouse foreman, your financial officers. With this kind of access, data becomes a firm resource that can be used to make you more money, just like other business assets.

Increased Security. With a DBMS, there is no need to build a separate password scheme or other security device for each program. Standard security functions will protect all data.

The Drawbacks Of Data Base Management

Small computer DBMS's are often great in theory, but lousy in practice. Most of the manuals are impossible to read by people who do not have a data processing background. In addition, many of the packages on the market don't have the power and sophistication to handle serious business computing. Some require you to "sort" the data regularly to maintain it in the right order. These sorts can take many hours.

One beauty of the data base approach is the ability to build many applications around one set of information. But because the field is still so new for small computers, very little applications software has been written around the existing DBMS products. Expensive custom programming is usually necessary.

Don't believe the ads that say non-programmers can use a small-computer

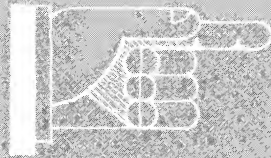
DBMS after a few hours of practice. You might be able to build a simple mailing list on your own, but for more complex business applications a DBMS requires more expertise than can be found (or afforded) by a typical small business.

Conversion is also a problem. It's a lengthy and often costly process. Sometimes current computer files can be read by the DBMS and entered directly into the data base. Other times, all the information must be retyped into the new system. Either way, you will have to run both your old and your new system side by side for a while until the new DBMS has been fully debugged.

In addition, many small computer users may not be able to get full value from a DBMS because of hardware limitations. Do not try to bring a DBMS on board without a hard disk system. Floppy disk systems just don't have enough memory storage. To get the most out of a DBMS you must have the entire corporate data base on-line. You can't be swapping floppy disks back and forth. Even a small firm will need 5-10 megabytes, which is more than you can keep on-line with floppies.

Obviously, if file-oriented programs are doing the job for you, there is no reason to switch; we would recommend that you ignore the splashy ads in the trade papers and resist the urge to join the fad. If, on the other hand, you have thought about buying or modifying your current software, we suggest that you consider data base management as one alternative. Weigh its merits side-by-side with those of file-oriented programs.

Here's the bottom line: A DBMS system can be a good way to make a small computer system grow up *if* it is priced about the same as file-oriented programs that do the same job, *if* it is a proven system with local training and support available, and *if* it has good-quality applications software already written. Some small computer users will find that those *if's* pose too great a roadblock at this stage of development. Nevertheless, data base management is the wave of the future. Small computer users should keep a close eye on its growth and development.



CONSUMER ALERT

Shopping For A Data Base Management System

Many of the small computer DBMS products on the market are quite primitive. Given the current state of the art, it would be easy for a buyer to end up filling the role of guinea pig for the software supplier. Finding a good DBMS, therefore, will involve quite a bit of work on your part. Your job will be to find out if the systems you look at are (1) tested, workable products with all the most important features, (2) right for your particular needs, (3) a good value for the money, and (4) supported by a reputable firm that will be around for a while. Here are some tough questions you can put to vendors to help you discover which system is best for your firm.

How easy is it for the end-user to work with? For example, how easy is it to edit your entries. With some systems, you cannot go back to edit a field once you have entered it. The only way to make corrections is to cancel the entire entry and start over again. Naturally, a primitive data entry scheme like this will be frustrating to operators and very time-consuming.

A flexible, easy-to-use report writer is absolutely crucial. Some systems are understandable only to programmers and technical types. End users should be able to specify, in simple English commands, just what they want to appear on the report. Check to see if the program prompts the operator and offers help if needed, or if users are expected to memorize the procedures and commands. Can you have extended, partial or no prompting at the operator's convenience?

How good is the instruction manual? This is vital to any software, particularly in the microcomputer field where users typically get less support from vendors.

Does it have computed fields? It's silly to have to use a hand calculator while sitting in front of a computer. Consider the example of an inventory system. With computed fields, you could enter base price and the computer would then calculate markup, tax, shipping charges and discounts and enter the results into the data base.

How much information can the system handle? What is the maximum number of records you can have? Will that be enough for your business?

Is it portable and flexible? Can the database be moved to another computer if you convert? Can it work with different operating systems and programming languages? Can you call a subroutine (from another program) without leaving the DBMS?

Can you change the data base after it has been designed? Suppose you decide you'd like to include a new field listing the customer's credit limit. Can you do it without tearing down the existing data base and starting over? If you add fields or new record types, there should be no need to change existing programs.

Can you add additional hardware? When you buy that new hard disk, will you be able to tell the software about it so the system will use that extra memory? Or are you tied to your original configuration?

How easy is it to interface the DBMS with other programs? The beauty of a DBMS is the possibility of sharing data among many applications. Check to see how easy it is to connect the DBMS with other programs. Does the manual provide instructions and examples of how to do this?

Is packaged application software available using the DBMS as the foundation? A few of the better systems have a small library of compatible applications programs already for sale.

Is custom support available? All serious business applications eventually profit from custom support, and most could use it before starting the trip.

How easy is it to convert? Can the DBMS read your current files and add the information to the data base? Can you split fields after the original data base has been set up?

How fast is it? This will be tough to ascertain until you get all of your records into the computer. Perhaps your best bet is to call a current user with a data base at least as large as yours to find out about response time and sort time. Some systems may take several minutes to find a given record and several hours to sort through the entire data base.

Can it sort on multiple fields? Make sure that it is easy to ask "multiple choice" questions. For instance: How many inventory items do we stock that come from West Coast suppliers and that cost more than \$5.00 and less than \$15.00 of which we have sold less than \$100 in the last six months?

Does it provide for data security? Can you prevent unauthorized access to sensitive information by operators?

Technique #3—Decision Support For Small Computers

Networking and data base management will make your small computer grow up by expanding its capabilities. You can also make it more valuable by using it for purposes previously reserved for large corporate users. For instance, computerized decision support—financial modeling, business graphics, etc.—has been around for years. It can be a tremendous boon to business people. Until recently, however, only giant corporations could afford it, because it required the power of a large computer.

Within the last years, the benefits of decision support have become available to anyone with access to a small computer. But to put a small computer to work in this fashion, you must understand the capabilities and limitations of currently available software.

We advise waiting to buy decision support software until you find out if it can be genuinely helpful. Below you will find a general discussion of decision support, its capabilities and its limitations. We have also provided an overview and examples of three important decision support categories: (1) spreadsheet analysis, (2) financial modeling and planning and (3) graphics. At the end of this chapter are case histories of decision support users and a buying guide to some of the most popular programs.

Let's start by talking about the things all three types of decision support software have in common—including, unfortunately, some limitations.

How Do Small Computers Help With Decisions?

Just how can your small computer help you make day-to-day business decisions?

The computer doesn't actually make any decisions. It merely processes great volumes of data and presents it in a more manageable form.

By putting data in a more manageable form, small computers help you plan for the future, spot trends, make projections, etc. For instance, decision support programs help managers plan by allowing them to ask "what-if" questions and get the answers back in seconds:

- What if the cost of materials went up? How would that affect profits?
- What if taxes went down? Could we afford to hire more employees?
- What if we continued to grow at our present rate? How much cash would we need by this time next year?

Or, they can quickly make comparisons:

- How does the performance of my stock portfolio compare with the market as a whole?
- How do the sales of our newest store compare to our others?
- How does actual performance compare to budget?

In summary, then, small computers aid in decision support by "massaging" data and presenting it in more manageable form so users can ask "what-if" questions and make comparisons. If these benefits sound familiar, it's because they have been available for years on mainframe computers and time-sharing systems.

But small computer decision support is less expensive than the time-sharing variety. With connect fees ranging from \$5.00 to \$50.00 per hour and additional fees for data storage, large corporations routinely run up time-sharing bills in the thousands of dollars. Compare this to the one time cost of \$50 to \$1,500 for decision support software. Moreover, small computers are starting to sport many of the capabilities found previously only on large machines.

The Limitations

Despite the advantages, decision support on small computers still has many limitations—limitations you should know about before you spend any money.

Since many buyers have inflated expectations, we want to repeat that small computers don't make decisions on their own. With or without computerized decision support, business planning requires a great deal of intuition and experience. The software will not make your decisions any easier. It will merely allow you to study more options and examine more scenarios in a short time.

Moreover, many first-time buyers don't realize how long it takes to become proficient with decision support software. In general, the better and more expensive the program, the harder it is to use. Programs that emulate time-sharing systems, for instance, take about a month of daily practice to learn. Even the less complex VisiCalc-style programs take days or even weeks to master.

And because the better programs have more options and choices, only those with **some financial know-how** will be able to use them. **Business people and professionals** without financial or accounting experience should probably get their feet wet with inexpensive programs.

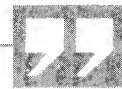
Decision support programs, in other words, have a fairly steep learning curve. This difficulty is compounded by the need to start from scratch with each different program. A few recent programs are part of a "family," but you generally must learn a new program, new commands, new procedures and new protocols for each new task. Since most programs cannot accept information from outside data bases or integrate with other software, data must be manually compiled and re-entered each time.

Time Is Not On Your Side

Compared to time-sharing systems, small computers have lower processing speeds plus limited memory and storage capacity. It can take as long as several days or a week for a manager to set up a financial plan using typical software. And since most small computers can only be operated by one person at a time, this can create all kinds of scheduling problems. Where do you put a piece of equipment that's used by a secretary for word processing, by the bookkeeper for accounting and by the owner for decision support?



Many small computer programs suffer from a lack of "human engineering." It's usually harder to get them to perform than the makers admit.



In addition, many small computer programs suffer from a lack of "human engineering." It's usually harder to get them to perform than the makers admit. Some programs require an intimate knowledge of the computer and its operating system; pushing the wrong key can cause the whole system to crash. Then there are the instruction manuals—some are poor in the extreme, written in computerese that only another programmer could understand.

Still, small computer software is steadily improving. One reason for the phenomenal success of the VisiCalc program—the best-selling microcomputer

program of all time—is the simple fact that it is designed for non-technical users rather than computer types. VisiCalc has set a standard that most new entries try hard to uphold.

What's On The Market

Despite the limitations listed above, most business people can be reasonably sure of getting useful decision support software if they: (1) see a demonstration to ensure that it is “human engineered;” (2) check out the documentation before buying and (3) buy only from dealers that offer local support (classes, phone numbers for technical questions, newsletters, automatic upgrades, etc.).

Given these precautions, you may well be able to profit from some of the software packages now on the market. To give you further insight into what's available, we have divided current decision support offerings into three categories: (1) spreadsheet programs, (2) financial modeling and planning programs and (3) graphics programs. You'll find details about each category below. Our description should give you enough of an overview to decide if you could make good use of decision support in your job.

Spreadsheet Programs. Programs in this category transform the computer screen into an electronic version of an accountant's spreadsheet. A few days' training with spreadsheet software virtually eliminates the need for calculator, pencil and paper for planning and analysis. VisiCalc, the original spreadsheet program, is the most widely-used decision support program around. Some people purchased their first small computer just to use VisiCalc.

Spreadsheet software automatically does what was previously accomplished laboriously by hand. To begin, you label the rows and columns on the screen and define their mathematical relationships. You might, for instance, set up a Profit and Loss Statement where Gross Profits equalled Sales minus the Cost Of Goods Sold. Once you have explained this relationship to the computer, it handles all

calculations for you. Enter this year's Sales and Cost of Goods Sold, and the computer figures the Gross Profits. "What-if?" questions can be answered immediately. Increase the Cost Of Goods Sold by 10 percent, for example, and the machine will instantaneously display the effect this would have on Gross Profits.

Multiply this simple example by the dozens of mathematical relationships and calculations that occur in financial analysis and you will understand why users claim that spreadsheet programs save them days over manual methods. This is particularly true since once you've designed a format you can use it over and over again—the computer "remembers" it for future use.

Spreadsheet programs are in daily use by thousands of managers and small businesspersons for financial reporting, cash flow forecasting, investment analysis, budgeting, planning, engineering analysis and more. All of the leading microcomputer manufacturers sell either the original VisiCalc or a look-alike program that does something similar.

Financial Modeling And Planning Programs. With a financial modeling program, you can simulate the future. The name of this category might be misleading, since spreadsheet programs are so often used for financial modeling. Indeed, some of the programs in this category are complex spreadsheet-style programs with many options and alternatives. But many of the programs don't use the spreadsheet approach. Instead, they ask questions or provide a form to fill in, then process and display the results.

The simplest type of financial modeling software handles one particular type of model. Examples include cash flow forecasting, sales tracking and planning, business start-up planning, lease versus purchase and tax planning. You put in the correct values and the machine does the math, allowing you to look at many alternatives in a short period of time.

The next step up is software intended for small businesspersons or managers without a financial background. Often these programs have been written by financial experts and feature comprehensive instruction manuals. By answering

questions and/or filling in the blanks, a user can apply sophisticated financial modeling tools to questions about investments, sales forecasting, inventory purchasing, business cycles and more.

The most advanced financial modeling and planning programs help you predict the future business climate for your products and the impact of different alternatives in the future. Many of them are small computer versions of time-sharing software for large computers. Several of these programs are almost equivalent to large machines in sophistication and flexibility, although they cannot compete in the areas of data storage or computational speed.



Although all small computers can create some type of graphics if you know how to program, the new software makes it easy.



Graphics Programs. Business graphics have been coming on strong for large computers, and recently products have appeared that bring some exciting capabilities to small computers. Many decision support programs now come with “built-in” graphics. What’s more, there are numerous standalone programs that help users make decisions by putting important information in easy-to-understand graphic format.

Although all small computers can create some type of graphics if you know how to program, the new software makes it easy. They accept English language commands or take data from other programs to create graphs, pie charts, bar

graphs and area plots. Users have control over format, colors, scale and titles. Displays can be created on the screen and transferred to paper (with the right plotter or printer, of course). Most programs will save charts for future use.

Other graphics programs supply mathematical and statistical functions that permit them to forecast trends. For users who understand such things as moving averages, multiple regressions, trend line forecasting and so on, these programs offer sophisticated decision-making tools.

Is It Time For Your Small Computer To Grow Up?

Small computers are terrific for applications like accounting, inventory control and word processing. But once these functions have been successfully automated, you may well be able to get even more from your computer investment. Your small computer can act like a big one through techniques such as local networking, data base management, telecommunications and decision support.

And these are just a few of the methods you can use to increase the payoff of your small computer. In the following chapter, we will look at ways to let it talk to the rest of the world.



CASE HISTORY

WHAT CAN I LEARN?

SMALL COMPUTER DECISION SUPPORT IN ACTION

Case History #1: A Large Corporation

Why would a corporate manager with access to an IBM 370 use a Radio Shack Model II for decision support? Dr. David M. Chereb, marketing systems manager of McCulloch Corporation, Los Angeles, California, originally turned to a small computer out of necessity.

"When I arrived at McCulloch in November, 1979, we expected a recession in the spring," Chereb told ACU. "We had to put together a sales forecast in time to take action, but there would have been a delay to get the IBM gear we needed. Out of necessity, I put it together on a microcomputer."

Although saving time was the original motivation, Chereb continues to use small computer decision support because it saves money. "We made such extensive use of time-sharing that our monthly bills had climbed to \$3,000 per month," he said. "By using a microcomputer supplemented by occasional use of our in-house mainframe, we have cut our monthly time-sharing budget in half."

Dr. Chereb is one of the country's best-known proponents of business planning with microcomputers and several of his decision support programs are now for sale under the name *The Business & Forecasting Package*. Nevertheless, he is the first to admit that not every planning job is suited to small computers. "Where you have a tremendous amount of records to process and need a lot of disk storage," he advised, "then you need a large computer."

"But if you are talking about risk analysis and forecasting, you can usually use a micro," he continued. "While those tasks require sophisticated programs and algorithms, they don't need large amounts of disk storage. In fact, 90 percent of all companies could use a microcomputer for 90 percent of all their business planning."

On the other hand, small decision support is not without its pitfalls. "A microcomputer is not going to replace sound business judgement," Chereb warned. "But it should make your job a little easier and save you a little money."

Chereb warns that switching to a small computer means trading off old frustrations for some new ones. Without decision support, managers must often "shoot from the

hip because they don't have all the information they need," he said. But when you bring a microcomputer on board, he cautions, "you are going to have some hardware and software problems. And you are going to get some strange things on the screen—there is a certain amount of changeover anxiety until you learn to use it."

All in all, however, the frustrations of small computer decision support are outweighed by the benefits, Chereb believes. "Our microcomputer paid for itself in less than 6 months just in the savings on our time-sharing bills," he reported. "Anyone who owns a business large enough to need a typewriter could probably use a microcomputer."

Case History #2: A Medium-Sized Manufacturer

Although Plastiglide Corporation, a manufacturer of plastic parts and components, owns a large Burroughs computer and has its own DP staff, corporate management turned to small computers several years ago when it needed more decision-making information.

Ralph Trustman, one of Plastiglide's founders and now a consultant to the firm, helped pioneer the use of microcomputers at the Hawthorne, California-based company. "With the big computer, it's hard to go in there and get something out," Trustman explained. "The Burroughs runs 16 hours per day handling inventory control for our manufacturing, which typically runs through 15 million parts per week. We decided it was just easier to use desktop machines."

Trustman has written a half-dozen programs for the Radio Shack TRS-80 Model II which he uses, and Plastiglide's controller has written several programs for his Apple II. In addition, they make heavy use of VisiCalc and a few other packaged programs. Typical applications include running pro-forma balance sheets, asking "what-if" questions, keeping track of profit-sharing, sales charts and graphs, forecasting, and automated price estimates.

Has small computer decision support paid off? To answer that question, Trustman told ACU the story of Plastiglide's vice-president for quality control. Before that individual got a microcomputer, the information he needed was always 5 to 8 days late. He often found himself forced to recall flawed parts that had already been shipped, at great expense.

So he purchased a desktop computer, figured out how to use it, and taught his secretary to enter the data. Now he gets the decision-making information he needs within 24 hours. Trustman says that after one year, Plastiglide's savings from this one application were more than \$100,000.

Case History #3: A Small Business

Corporate managers and financial officers aren't the only ones who can profitably use decision support. Within the last two years, several packages have been developed that small business owners can learn to use quickly and easily. Indeed, a few programs have been developed specifically for the small business market.

One such program is currently in use at the Colie Stoltz Music Company of Memphis, Tennessee, a \$3/4 million single-location retailing firm that sells sheet music and musical instruments. *Finplan*, distributed by Hayden Book Company for \$75, is a financial planning and forecasting tool for small businesses. "We use it to do cash value analysis and inventory valuation for future purchases," explained general manager Wendel Stoltz. "We can crank in different inflation factors and see what the results would be when deciding what and how much to carry."

Stoltz told ACU that he had been trying to make business forecasts manually for years, "but some of our three year forecasts were pretty flaky." *Finplan* has helped. Not only does the program do all the calculations, but the manual has been designed to teach a novice about business planning as he learns to use the program.

The package has two modules. The first covers the basic aspects of running a small business, while the second handles more detailed analyses. *Finplan* generates pro-forma balance sheets, income statements, analysis ratios and makes projections for up to five years. The user can ask "what if" questions, then have the program recalculate the results.

Does Stoltz think decision support software is genuinely valuable for small businesses? "It's a real help for an established company," he responded. "So many entrepreneurs are good at the day-to-day planning to get a business off the ground, but they can't adapt their managerial style to long-range planning. They end up flying by the seat of their pants. Decision support can help them to think long-range."

Still, Stoltz has some warnings about the use of forecasting programs: "You have to realize," he cautioned, "that you are a small business and there are some factors you just don't have any control over. What's more, the projections you get are general—they have to be tempered by your individual judgement and by consultations with your tax people, your bankers and other advisers."

So what's the bottom line on decision support for small business? Stoltz concluded: "When you compare the price of these programs to the price of a consultant, you realize that the cost of decision support software is nominal."

COMMONLY USED DECISION SUPPORT SOFTWARE FOR DESKTOP COMPUTERS

Electronic Spreadsheet Software

CALCSTAR

\$295
CP/M
MicroPro International
1299 Fourth St.
San Rafael, CA 94901

DESKTOP/PLAN II

\$200
Apple
VisiCorp
1330 Bordeaux Dr.
Sunnyvale, CA 94086

EXECUPLAN

\$150
Vector Graphic
31364 Via Colinas
Westlake Village, CA 91362

MAGIC WORKSHEET

\$250
CP/M
Structured Systems Group
5204 Claremont
Oakland, CA 94618

PLAN 80

\$295
CP/M
Digital Marketing
2670 Cherry Lane
Walnut Creek, CA 94596

PLANNER PLUS

\$200
Ohio Scientific
1333 S. Chillicothe
Aurora, OH 44202

SUPERCALC

\$295
CP/M
Sorcim Corporation
405 Aldo Ave.
Santa Clara, CA 95051

TARGET

\$195
CP/M
Advanced Management Strategies
P.O. Box 95130
Atlanta, GA 30347

T-MAKER II

\$275
CP/M
Lifeboat Associates
1651 Third Ave.
New York, NY 10028

UNIVERSAL COMPUTING MACHINE

\$99
Apple, TRS-80
Spectrum Software
P.O. Box 2084
Sunnyvale, CA 94087

VISICALC

\$99-299
Apple, Atari, Commodore,
Hewlett-Packard, TRS-80
VisiCorp
1330 Bordeaux Dr.
Sunnyvale, CA 94086

WORKSHEET

\$200
CP/M
The SoHo Group
140 Thompson St., Ste. 4-B
New York, NY 10012

Financial Modeling And Planning Programs

BUSINESS DATA BASE

\$90
TRS-80
Charles Mann & Assoc.
55722 Santa Fe Trail
Yucca Valley, CA 92284

BUSINESS PLANNER

\$295
Apple
Duosoft
Box 1827
Champaign, IL 61820

BUSINESS PLANNING & FORECASTING PACKAGE

\$200-400
TRS-80
Applied Economic Analysis
P.O. Box 302
Allamuchy, NJ 07820

DECISION MASTER

\$30
Apple, TRS-80
Syntonic Software
10428 Westpark
Houston, TX 77042

FINANCIAL MODELING

\$500
CP/M
American Business Systems
459 Littleton Road
Westford, MA 01886

FINPLAN

TRS-80
\$74.95
Hayden Publishing
50 Essex St.
Rochelle Park, NJ 07662

FORECAST

\$110
CP/M
The Software Establishment
705A Lakefield Rd.
Westlake Village, CA 91361

FPL (FINANCIAL PLANNING LANGUAGE)

\$695
CP/M
Lifeboat Associates
1651 Third Ave.
New York, NY 10028

MICRO-DSS/FINANCE

\$1,500
Apple
Addison-Wesley Publishing
Reading, MA 01867

MICROPLAN

\$495
CP/M
Chang Laboratories
10180 Barbara Lane
Cupertino, CA 95014

MINIMODEL

\$495
CP/M
Financial Planning Associates
25 Van Zant St.
Norwalk, CT 06855

ORACLE-80

\$100
TRS-80
Instant Software
Peterborough, NH 03458

Graphics Programs

APPLE PLOT

\$70
Apple
Apple Computer
10260 Bandlely Dr.
Cupertino, CA 95104

THE COMPLETE GRAPHICS SYSTEM

\$60
Apple
Co-op Software
P.O. Box 432
West Chicago, IL 60185

DATA-GRAPH

\$50
Apple
Hayden Book Company
50 Essex St.
Rochelle Park, NJ 07662

DATA PLOT

\$60
Apple
Muse Software
330 N. Charles St.
Baltimore, MD 21201

EASYTRAK

\$100-140
TRS-80
Plus Computer Technology
P.O. Box 1152
Angleton, TX 77515

TREND-SPOTTER

\$175
Apple
Software Resources
44 Brattle St.
Cambridge, MA 02138

ULTRAPLOT

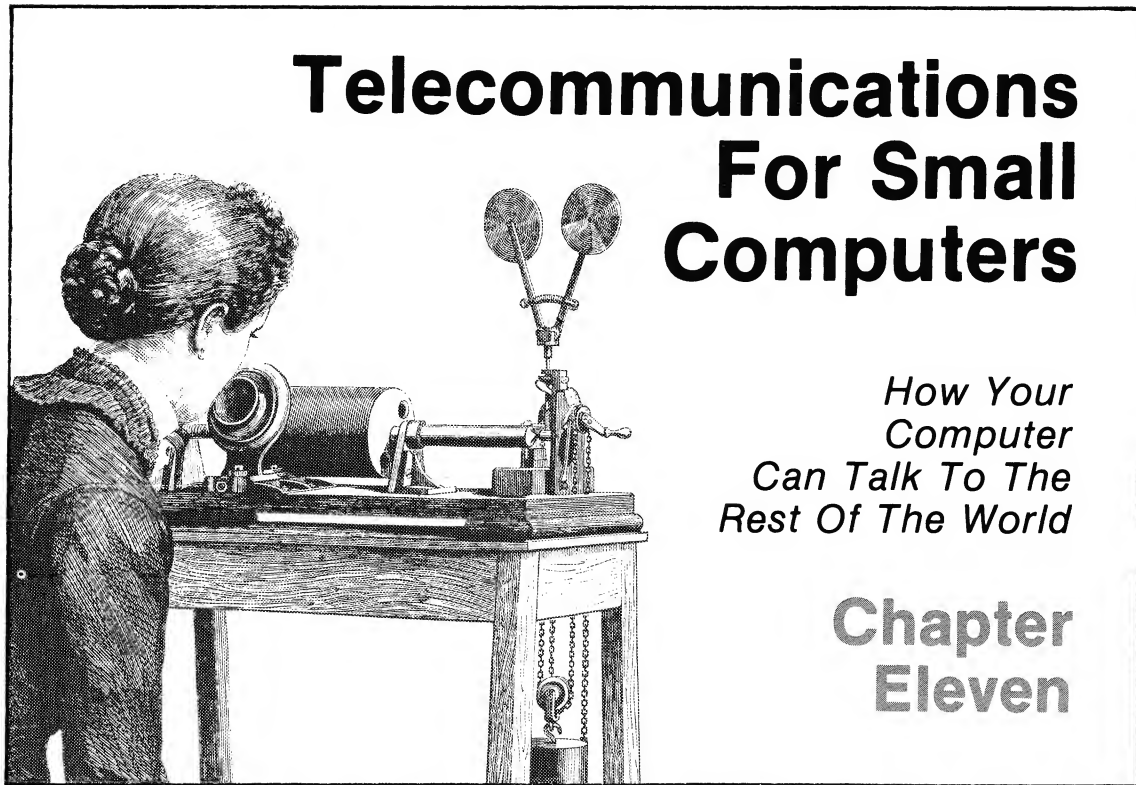
\$70
Apple
Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97430

VISIPILOT

\$180
Apple
Visicorp
1330 Bordeaux Dr.
Sunnyvale, CA 94086

VISITREND

\$260
Apple
Visicorp
1330 Bordeaux Dr.
Sunnyvale, CA 94086



As described in the previous chapter, local networks allow nearby small computers to communicate. But small computers can also talk to the rest of the world via the telephone lines. This type of application, called **telecommunications**, was previously used only by large corporations that could afford its high price. Now the price has come down, within the reach of small computer owners.

Telecommunications has a variety of potential uses. In the small computer world, two of the most common are electronic mail and data base access.

Electronic Mail

Few, if any, companies invest in computers just to get electronic mail. Instead, it

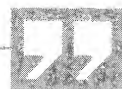
is usually added as an afterthought by companies that bought small computers for other reasons.

What is electronic mail? Although a standard definition is still lacking, it is generally considered to be the electronic delivery of messages that would otherwise be sent via the post office or the telephone. A bewildering array of systems go under the name "electronic mail." They range from time-sharing services, to computer-based message systems, to facsimile machines to communicating word processors. Most small computer users, however, simply add a modem—a device that allows your computer to talk over the phone—and an inexpensive software package to their existing system.

With this simple setup, small computer users are beginning to put electronic mail to work in their businesses. Although still far from widespread use, it handles a growing share of everyday business correspondence. Companies are using small computers as a fast and inexpensive means of sending memos, charts and reports between offices in different locations.



Although still far from widespread use, electronic mail handles a growing share of everyday business correspondence.



Neither Rain, Nor Sleet, Nor Power Failure . . .

Electronic mail offers the speed and convenience of a phone call without the problems of "telephone tag." Like a letter, it offers the option of a printed copy, but without the delay and uncertainty of the post office.

One of the most common applications is placing orders. Many wholesalers and distributors now allow customers with small computers to order electronically. Examples include such industries as automotive parts, electronic components, motorcycle parts, needlecraft supplies, and plumbing supplies. This type of electronic mail saves time and eliminates errors.

Many companies also use telecommunications for their outside salespeople. Using portable terminals, representatives can dial up the company's small computer to get statistics, make a sales presentation, confirm that inventory is in stock, or place an order for a client. The home office can also send messages to the sales rep.

Along similar lines, some newspapers use electronic mail to transmit stories from remote locations to the main office. And firms with widely separated offices or overseas branches use electronic mail to communicate without delay and without regard to time differences.

Some of these schemes depend upon a large, central computer owned by either the sender or the receiver. If you are a small retailer, for example, you cannot electronically order stock unless your supplier has a computer that is set up to process your orders.

But small computer systems can do similar jobs without the expense of a large computer. They can communicate with each other, or almost any computer, over ordinary telephone lines. Electronic mail programs are available for almost every brand of personal computer. All that is needed is the software, a modem and someone on the other end equipped to receive the message.

In Iowa, for example, a commodity trading advisory company uses an Apple computer and a program called Micro Courier to send daily charts, graphs and commentary about the commodity futures market to clients who used to get the information through the mail. Likewise, small computers in the six regional distribution centers of J.C. Penney Co. automatically send sales reports to the accounting office in New York at night when telephone rates are low. The reporting job was too small to justify plugging into the main computers.

Electronic mail is also available to small computer users on a subscriber basis from such services as CompuServe and The Source. These firms have large mainframe computers which you can access via phone lines. As with a conventional time-sharing service, you are billed for the time you are actually "logged on." You compose your message on your small computer, then send it to the central service, which stores it until the addressee checks in and asks for it. If you ask for your "mail," the central computer sends it to your screen. With services like these, you can transmit to anyone who also subscribes.

Unfortunately, the various electronic mail data bases do not communicate with each other. There is no way to send messages between services. There are other limitations on the type and size of messages you can send with these services. As a result, they are not yet in widespread business use.

Data Base Access

Several of the subscriber services that offer electronic mail—CompuServe and The Source, for example—also offer large scale data bases with all types of information. More and more businesses are using their small computers to mine the wealth of information available from on-line data bases.

Previously, only large companies could afford the expense of having continually-

updated mainframe computers on call. But now small computer owners can have the same intelligence-gathering abilities as their larger rivals, for an investment of a few hundred dollars. Information can be dispensed directly over the phone lines to your small computer. You can get stock prices, financial information, trade and commodity figures, current events, technical developments, and much more. Fees range from a few dollars per hour to hundreds per hour, depending on the service in use.



Intelligent use of these information storehouses can save you countless hours.



Each service has its own routine, but access usually takes no more than turning on your computer, dialing up the service and keying in your ID code. A few services, like the Lexis legal-research data base, require their own special terminal with custom keys. Most, however, will work with almost any small computer.

Obtaining financial reports of competitors, charting market growth, monitoring price trends, assessing the demographics of a new market—these are some of the ways small computer owners are using on-line data bases. If you only need information occasionally, you can go to a retail information service. These companies have computer terminals already hooked up to a variety of data bases. When you call these research professionals, they develop a strategy to fulfill your

request and then execute the search for you. If you've never used a data base before, buying a single search is a good way to try it out.

If you have a continual need for data—as with, let's say, a stockbroker—and you already own a small computer, you may want to forego the middleman and hook up directly to one of the services. The major benefit to direct data base access is timeliness, the ability to quickly retrieve information at a central location without spending time searching random sources. Intelligent use of these information storehouses can save you countless hours.

The Dangers Of On-Line Data Bases

One danger in having a wealth of information on hand is the tendency to explore. Few small computer owners can afford that luxury when the meter is ticking away at up to \$300 per hour. Moreover, each different data base service has its own special protocols and codes. It can take hours of expensive time to get proficient. Unless you know the key access words, you can spend far too long finding information.

Experienced users suggest planning carefully before actually dialing up the service. Don't use a haphazard search strategy. Instead, determine in advance which key words are most likely to call up the information you need. Have some alternates on hand in case your first try draws a blank.

Because the technology is so new, some data bases aren't as well managed as they should be. Occasional technical difficulties may block quick access. And some services lag behind in updating their data bases. This delay can be a problem for users who need the most current figures.

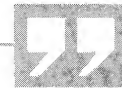
Locating An On-Line Data Base Service

Access to a data base service doesn't have to cost a cent if you can find a trade association, government agency, supplier or library who is on-line and will

make an occasional search for free. To locate computerized government data, contact the Bureau of the Census and ask for *Telephone Contacts for Data Users* or check with National Technical Information Service, Arlington, VA and ask for the *NTIS Directory of Computerized Data Files, Software and Related Reports*.



As with any computer or computer service, you should try out a data base service before you buy. You should judge the amount and quality of the information, but also how easy it is to get to that information.



Locating just the right commercial data base service can seem like a monumental task because of the large number of vendors spread across the country. ACU members can call headquarters for names and addresses. Other readers might want to turn to their local library for a list of names (ask for the *Directory of Business and Financial Services* or the *Encyclopedia of Business Information Sources*).

As with any computer or computer service, you should try out a data base service before you buy. You should judge the amount and quality of the information, but also how easy it is to get to that information. If it is hard to learn or time-consuming to use, you may not get your money's worth. And take a close look at the cost, including monthly charges, connect fees and special terminals (if any).

Selected On-Line Data Base Services

ADP Network Services

175 Jackson Place
Ann Arbor, MI 48106

Bibliographic Retrieval Services

Corporation Park
Building 702
Scotia, NY 12303

CompuServe Information Services, Inc.

500 Arlington Centre Blvd.
Columbus, OH 43220

Dialog Information Services

3460 Hillview Ave.
Palo Alto, CA 94304

Dow Jones News Service

22 Cortland St.
New York, NY 10007

Informart

One Yonge St.
Toronto, Ontario
Canada, M5E 1E5

Informatics Inc.

6 Kingsbridge Rd.
Fairfield, NJ 07006

Mead Data Central

200 Park Ave.
New York, NY 10166

New York Times Information Service

1719-A Route 10
Parsippany, NJ 07054

SDC Search Service

2500 Colorado Ave.
Santa Monica, CA 90406

Source Telecomputing

1616 Anderson Road
McLean, VA 22102

Directory of OnLine Databases

Cuadra Associates

1523 Sixth St., Suite 12
Santa Monica, CA 90401

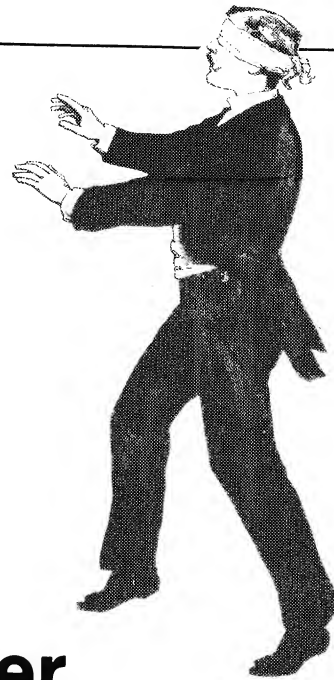
Datapro Directory of On-Line Services

Datapro Research

1805 Underwood Blvd.
Delran, NJ 08075

Chapter Twelve

Unearthing Additional Income From Your Small Computer



How To Find Hidden Profits

We hope that previous chapters have helped you overcome the problems that beset many computer owners. The areas we discussed—installation, operation, management, security, disaster planning—should be your initial areas of concern. Failure to overcome these hurdles can turn a computer into a financial drain. The first order of business is to use your computer to save money for your present operation.

But once you have mastered the day-to-day use of a computer, you may want to turn your attention to making additional money from your machine. Many small computer owners have paid for all or part of their original investment by generating additional profits.

Small computer owners have three potential profit centers: selling computer services; selling computer time; and selling computer software. All too often, however, these money-making opportunities are never explored. This chapter will

share some of the ways users have uncovered profit bonanzas with their small computers.

Selling Computer Services

In the past, selling services was the most common way to generate additional income with a computer. Dozens of smaller service bureaus around the country got their start as in-house computer systems. In order to make use of unused computer resources, the owners began renting out time to others in their industry.

With the price of computer hardware dropping dramatically, however, fewer people need to buy services. If they can afford the fees, they can usually afford to buy their own machines. But if you perform a specialized service, have unusual software, or set your price low enough, you can still find interested customers. Some small businesses don't want to computerize all of their operations, just one or two applications. And some business owners can certainly afford a computer but don't want the hassles.

Every profession has its unique problems. You may find eager customers for your computer services if you have a hardware/software setup that solves those problems. For instance, many users who bought their computer to automate their own billing have been able to sell services to others in their industry.

Health care billing is a common example. Doctors, dentists, psychiatrists and counselors must struggle with the preparation of insurance claim forms and bookkeeping records. A simple automated billing system can cure the headaches of excess paperwork. In Southern California, to name just one instance, one bookkeeper successfully computerized the claims work and accounting of the psychiatric office for which she worked. Although she purchased a system with packaged programs geared for medical offices, she found that she needed to modify the programs to fit her particular needs.

Once modified, installed and debugged, the programs could do a month's billing

and bookkeeping in about four hours. With the sophisticated system lying idle for many hours every month, the bookkeeper began using the system to do accounting for other psychiatrists.

Now she processes the work of six local offices in addition to her own. Once a week she receives the insurance information, the patient charges and any check stubs. She enters the information and activates the system before she leaves at night. When she returns in the morning, the client's project is completed and waiting to be returned.

You may have originally installed your computer to save your own neck. Once you've solved your problems, you may discover that others in your field are willing to pay for your solutions. Other examples of small computer services include word processing, income tax preparation, bookkeeping and financial statement preparation.

If you attempt to sell computer services, you will find that price and personal service are your two biggest selling points. Generally, a small computer owner with specialized software can offer a lower cost to a small business than traditional service bureaus, which are set up to handle larger companies. And professionals and small business owners are more likely to go to someone who is willing to customize an application and gear it strictly to that person's needs.

Selling Computer Time

Some small computer users sell time on their machines to other businesses which have a limited need for access to a computer. This type of enterprise is easier if you own a computer that can accept multiple users and can process multiple jobs at one time. Occasionally, though, owners of single-user machines have successfully sold computer time.

Selling computer time has its difficulties. You must provide access to the machine. If your clients are in the same building, you may be able to connect a

terminal in their office to your machine. Otherwise, you will have to connect them via the phone lines, or allow them physical access to the computer during certain hours each week. In any case, you must have an operator who can be responsible for starting up the computer every day and performing various maintenance tasks. If you allow your customers to use the machine at your place of business, you will probably want a separate computer room to avoid disturbing your current business.

One small retailer we know found that he needed a larger computer, but could not afford the investment on his own. His store was located in an affluent neighborhood with many professional offices nearby. His solution was to sign up some of these businesses to buy computer time. The approach was so successful that he got his computer for “free”—his income from selling time was greater than the cost to lease the equipment. His time-sharing customers “subsidize” his use of the computer. In this case, the computer was a multi-terminal, multi-tasking model equipped with a hard disk. Users include a dentist and a lawyer who have terminals of their own in their offices. These professionals use the machine for word processing, client billing and accounting. They can use the machine whenever they want during working hours. Other customers have been allotted certain hours each week during which they are allowed to come into the computer room and use the equipment. A local restaurant and a tuxedo rental shop send in their bookkeepers to do accounting. A fast food chain uses its time to process its payroll.

Selling Computer Software

Many small computer users hire outside programmers to write custom software. And some non-technical people have learned how to program well enough to create useful software for specialized purposes. In an effort to recoup the development costs, these people sometimes attempt to sell their software to

others. Although their primary objective may be to recover their costs, they can reap additional profits as well.



When users hire a programmer, they often unknowingly sign contracts that give the programmer ownership of the resulting software.



With the price of computers falling within the range of even the smallest business, there has been a tremendous growth in demand for the software to make them perform. Established software vendors can't keep up with this demand, opening the door for users to sell programs they originally developed for their own use.

Large corporations with mainframes were among the first to flex their entrepreneurial muscles this way, but more and more small computer owners are joining the trend. Most license their programs to software publishers and then collect royalties. Some have even created data processing subsidiaries to market their products to other businesses in their industries.

A Colorado publishing house, for instance, decided to switch to an in-house computer several years ago because of rising service bureau costs. In less than a year, it had written the necessary programs, which were used successfully for a

year and a half. At this point, other publishers began to take notice. Now the firm exhibits at trade shows and uses direct mail to sell its software products.

Not all small computer owners will be legally entitled to sell their custom-written software. When users hire a programmer, they often sign contracts—sometimes without realizing it—that give the programmer ownership of the resulting software. Do not consider selling computer programs until you are sure you own the code!

The Pitfalls Of Selling Software

Users who solve the ownership issue find that selling homegrown programs is still a risky business. On the surface, selling software sounds like a simple process—duplicating a disk and sending it out in the mail are not very complicated. But if you think that's all there is to selling software, you will be in for a shock. It is easy to grossly underestimate the money, time and manpower needed to convert an internal programming operation into a profit-making venture.

Most of the risks are associated with selling programs yourself (as opposed to licensing it to an established software publisher). Taking a program tailored for your company and revising it for general use requires a hefty investment. Yet without such revisions, your chances of outside sales are slim. The likelihood that your software will fit other companies' needs without any changes is practically zero.

After adapting your program for general use, you must fine-tune it to work on other computer systems. Even if you have written your programs for a "standard" operating system like CP/M, this will be a time-consuming process. Next, you will need instruction manuals and other documentation. Few in-house programs have the comprehensive tutorial instructions required to sell commercially, so this will demand still more up-front investment.

There's more. Selling software demands a support staff to help users over the hurdles of installation. All software has bugs, some of which do not appear until

months, or even years, of use. These bugs must be corrected and the revised programs sent to buyers. And to be successful, a program not only needs to be well-written, adapted to general use, accompanied by good documentation and supported technically, it must also be aggressively marketed. That requires yet more staff.

All of these things demand up-front capital. Unhappily, that capital is at risk because software is so easy to reproduce. Piracy of successful programs is a mounting problem, with some software authors complaining that as many as ten illegal copies are made from every legitimate disk sold.

Licensing Software

One way around the dilemma of do-it-yourself sales is to license a publisher to sell your programs. You submit your software much like a recording artist submits tapes to a record producer. The software publisher evaluates it for its user-friendliness, documentation, probable markets and sales potential.

If the publisher likes the product, contract negotiation with the author begins. Some publishers give a flat fee, but most operate on a royalty basis, with royalties ranging from 15% to 30% and occasionally rising to 50% for programs in high demand. Once the agreement is made, you and the publisher go to work debugging the program, converting it to other computers, testing it and producing manuals. Finally, it is mass-produced in a variety of media formats.

Some software publishers are independent companies that specialize in this field, and some computer companies like IBM, Apple and Radio Shack are also interested in licensing software. It gives them a wider selection to offer customers while keeping their development costs down.

A concluding warning: In an effort to develop additional profits from your computer, it is possible to neglect your original business. Unless you really want to

change careers, be cautious about jumping into a new field that could interfere with current operations.

Before you start digging for hidden profits elsewhere, make sure that you have explored all the ways to use your computer in your company. Your time may be better spent in streamlining the business you have now than in learning the ins and outs of selling computer services, time or software.



CASE HISTORY

WHAT CAN I LEARN?

How One Small Computer Owner Discovered Hidden Profits

Robert Gavazzi, owner of Gavazzi Tire, a two-store operation headquartered in Raritan, New Jersey, wanted to move up to the computer age. He faced an annoying problem: The systems on the market weren't suited to the tire field, couldn't cope with the large number of inventory items and didn't deliver the most needed reports.

His solution: Design a computer system in conjunction with a programmer. Along the way, he realized that he could license the programmer to sell the resulting software to other tire dealers. Gavazzi ended up with a custom-tailored system that, through sales royalties, will eventually pay for itself.

Gavazzi originally had a computer service bureau handling his payroll and accounting, "but they weren't equipped to do the complex inventory control of a tire dealer," he said. Five years ago he switched over to an in-house computer with the purchase of a Basic Four Model 350. Although this system could handle payables, general ledger and invoicing, inventory control remained a manual procedure. No one

had yet written a program sophisticated enough to handle the needs of a tire dealer using a small computer.

So Gavazzi tackled the problem by hiring an independent computer programmer to develop the software. The project eventually expanded to take in point-of-sale functions. It was a teamwork effort, Gavazzi explains: "I developed the theories, and the programmer translated them into software."

When finished, the program was so successful that Gavazzi moved up to a larger computer system to take full advantage of the capabilities he now had. The new system, a Basic Four System 410, provides two terminals and a printer at the sales counter, and a third terminal in the office.

"I can invoice to a cash transaction or to a customer's account," says Gavazzi, "write a credit or write a work order. The work order can be brought back up at any time, and added to or charged as required. I can search for items without a specific item number, just by using the tire size. I can inquire on a customer's account for pricing, for account status, sales representative, even the phone number."

For the people on the sales floor, the computer has a number of built-in prompts that help to increase business. Whenever a tire sale is entered, the terminal asks if the customer wants valves and wheel balancing. It also shows the sales representative the quantity on hand of the size desired, and the multiple pricing structures available to help make the sale.

Indeed, the complex pricing structure of the tire business was an area that received special attention in creating the computer program. Base billing, cost, discount, any additional percentages, federal taxes and the ability to mark up from cost all had to be taken into account.

One important payoff to the system comes when it is time to place orders. Because of the complexity, it used to take Gavazzi's people as long as an entire day to make up the order from one manufacturer. The computer now does it in 30 to 40 minutes.

And Gavazzi is getting an unexpected additional payoff by selling the programs. His original aim was to provide a means to use a computer's capabilities in his business. Once the software was finished, however, the outside programmer realized that it would be valuable to other tire dealers as well. Gavazzi licensed him to offer it for sale as the "Tire Dealer Software System." In this manner, a computer system intended as a solution to internal problems has become a source of additional income that helps Gavazzi Tire keep rolling along.

*Congratulations!
You've learned how
to manage your small
computer . . . without
frustration.*



AFTERWORD

Congratulations! If you've made it this far, you've taken a big step toward getting full value from your small computer. You've learned how to manage the day-to-day operations; and how to get more out of it.

If you've taken the simple steps outlined in each of the twelve chapters, you will be forearmed against the difficulties that typically trap computer owners. Merely by knowing what kind of problems can come up, you are miles ahead of most small computer users. Most users learn too many of their lessons the hard way.

We urge you to continue learning your lessons the easy way: By studying the mistakes of others. The best place to do that is in a users group. We believe the Association of Computer Users is the finest example of such a group that you can find. Our non-profit, consumerist philosophy enables us to tell it like it is. Our

national scope allows us to offer unique benefits. For instance:

- our small computer insurance program,
- our phone-in reference service,
- our independent tests of computer equipment,
- our tell-it-like-it-is publications.

Membership in ACU can save you hundreds, or even thousands of dollars, because our organization is made up of people just like you. They are computer owners, consultants and industry experts who are willing to pass along their computer know-how to help others. ACU's goal is to help you make the path to successful computer ownership as smooth as possible.

We ask only one thing in return: that you share what you've learned. If you've come up with a solution to a problem, let us know. We'll try to pass it along to other users. If you know of a way we can make this book—or any of our publications—more useful to small computer owners, don't keep it a secret.

We want to hear from you.

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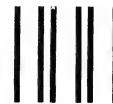
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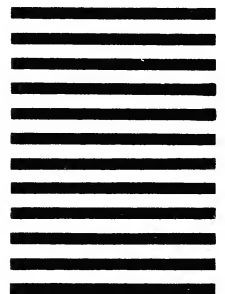
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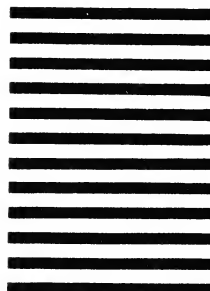
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How To Select Your Small Computer ... without frustration

ACU Computer Fitness Series, Vol. 1
208 pages, 18 worksheets



How To Manage Your Small Computer ... without frustration

ACU Computer Fitness Series, Vol. 2
256 pages, 13 worksheets

Written from the consumer point-of-view for business men and women, the books of the ACU COMPUTER FITNESS SERIES distill the experiences of thousands of members of the Association of Computer Users. ACU's motto is "It's **smart** to learn from your mistakes, but it's **even smarter** to learn from the mistakes of others." With numerous case histories and buying tips, these books are essential reading for those seeking unbiased advice on how to select and manage a small computer system.

Here are some nice things members have said about the ACU COMPUTER FITNESS SERIES:

"These two are invaluable tools for the computer purchaser. We used the worksheets almost verbatim and were very satisfied with the results received. There is no question in my mind that the investment in these two books will be returned many times over."

George N. Dumas
Executive Vice President
Penfield and Smith
Santa Barbara, CA

"How to Manage Your Small Computer ... Without Frustration is a gem—especially for the user without experience on large systems. In particular, the worksheets are very valuable, and we certainly plan to use them. In fact, we would have had to develop them internally if you hadn't prepared them for us ..."

Robert B. Clere
Time-Sharing Coordinator
Hartford Insurance Group
Hartford, CT

"It was a pleasure to read your new consumer guide, *How to Select Your Small Computer ... Without Frustration*. Your step-by-step approach should certainly lower the frustration level for first-time buyers. The worksheets are especially commendable, a real aid to bridging the communications gap between prospective buyers, consultants, dealers, etc.... Congratulations on a milestone publication!"

Frank Slaton
Manager, Computer Center
California State College
San Bernardino, CA

"With its worksheets, checklists and concrete user-oriented advice, your book is the best of its kind that I've found. I have a bookshelf filled with similar books, but *How to Manage Your Small Computer ... Without Frustration* is the one I'm using. That speaks for itself."

Lindon Doerr
Treasurer
Shamrock Chemicals Corp.
Newark, NJ

"How to Select Your Small Computer ... Without Frustration is a remarkable book that I wish I had in my possession a few years ago. You did a wonderful job of stating some of the vague ideas I had in a strong, clear and forceful presentation. All in all, I think you did a magnificent job."

Herbert L. LaBin
Teacher
Bellflower, CA

"I strongly recommend that all new users follow the guidelines in *How to Manage Your Small Computer ... Without Frustration*—it covers all the bases and is well written. I wish we had the book before we originally installed our equipment."

Robert J. Brasier
Data Systems Manager
Tipp Machine and Tool, Inc.
Tipp City, OH

"How to Manage Your Small Computer ... Without Frustration is an excellent guide for first-time microcomputer owners. The first section on how to get your computer up and running should be read and re-read before buying a small computer, and then read again after it is delivered. The chapter on disaster planning is worth the price of the book many times over. This is an excellent guide and belongs in every microcomputer user's library."

Stephanie M. Campbell
Systems Analyst
Real Estate Analysts of Newport
Newport Beach, CA

"I ordered *How to Select Your Small Computer ... Without Frustration* for use in my class on small business computer systems. I congratulate you for writing an excellent guide in such a lucid, easy-to-read style. My students, mostly local business people, will definitely benefit from it."

Frank Yeager
Associate Professor of Business
Jamestown Community College
Jamestown, NY

"This book (*How to Select Your Small Computer ... Without Frustration*) is absolutely super! Even though I am a technical type and a senior MIS (management information systems) manager, I found it extremely useful and a delight to study. It will be useful for larger-scale projects as well. You have done a fine job ..."

Robert E. Dodge
Director Information Systems
A. Johnson & Company
New York, NY

"Excellent—very useful, very easy to use. Thank you!"

Carolyn Ledewitz
System Analyst
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